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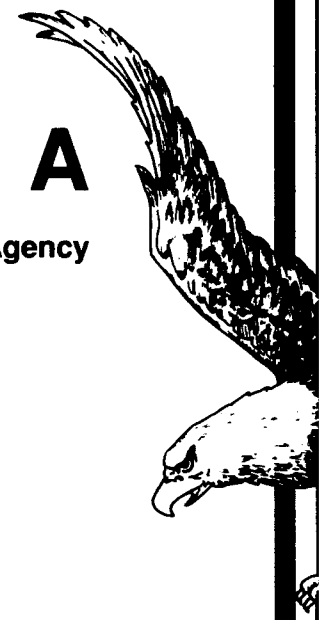

U S A T H A M A

U.S. Army Toxic and Hazardous Materials Agency

Report of Sampling and Analysis Results

Croom Army Housing Units
Croom, Maryland

August 1990

Prepared for:

U.S. ARMY TOXIC AND
HAZARDOUS MATERIALS AGENCY
Aberdeen Proving Ground
Maryland 21010-5401

Prepared by:

WESTON®
MANAGERS DESIGNERS/CONSULTANTS

Under the supervision of:

Environmental Assessment and
Information Sciences Division
Argonne National Laboratory
Argonne, Illinois 60439

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6c. ADDRESS *(City, State, and ZIP Code)*
Roy F. Weston, Inc.
Weston Way
West Chester, PA 19380

7b. ADDRESS *(City, State, and ZIP Code)*
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Roy F. Weston, Inc. has conducted a sampling and analysis program of the Army housing property located in Croom, Maryland. The objectives of this effort include further characterization of environmental contamination identified in an enhanced preliminary assessment carried out in 1989. The specific activities performed at this site were identification, evaluation of the condition, and collection of samples from specific suspected asbestos-containing materials, including floor tiles, pipe run and pipe fitting insulation, dust in the ductwork, and exterior siding, where present. These evaluations were necessary to clarify potential environmental issues identified in the earlier report, prior to the sale or realignment of the property.

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Joseph Ricci

22b. TELEPHONE *(Include Area Code)*
(301) 671-3461

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SAMPLING AND ANALYSIS AT THE U.S. ARMY FAMILY HOUSING UNIT (FHU) PROPERTY CROOM, MARYLAND

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EXECUTIVE SUMMARY

The U.S. Army family housing units (FHUs) at Croom, Maryland were inspected by Roy F. Weston, Inc. (WESTON) personnel during February 1990 to further evaluate the environmental concerns identified in the enhanced Preliminary Assessment reports prepared and submitted earlier by Argonne National Laboratory (ANL) for the U.S. Army Toxic and Hazardous Materials Agency (USATHAMA). Three of the 12 single-family housing units were examined on 27 February to investigate the possible presence of asbestos-containing materials (ACM). An assessment of airborne asbestos exposure was performed at one unit on this property on 26 April 1990 by a WESTON Certified Industrial Hygienist (CIH), because asbestos fibers were detected in the dust deposited within the ductwork of the heating system.

The ANL Draft Sampling and Analysis Plan, Revision 1 (SAP) specified sampling the following materials, where present, which are suspected to contain asbestos, from ten per cent of the housing units or a minimum of three housing units, whichever is greater.

- Pipe run insulation.
- Dust accumulated inside heating ductwork within the concrete slab, where present and open.
- Vinyl floor tiles.

The WESTON personnel selected three housing units for inspection after review of maintenance records and drawings, discussions with housing management personnel, and determination that the units were in similar condition. The housing units chosen, Nos. 04B, 04D, an 09A, were considered to be representative of the other nine units, but this was not confirmed by an examination of all the units.

Twelve dust samples, nine samples of floor tile and vinyl sheeting, and nine samples of pipe run insulation were collected by WESTON and analyzed. These analyses revealed that asbestos is present in dust accumulated within the heating ductwork, in floor covering, and in pipe run insulation at the three housing units examined. Asbestos was found in one of the 12 dust samples by transmission electron microscopy (TEM). Asbestos was quantified at 1% or greater by polarized light microscopy (PLM) in six floor covering samples, and was qualitatively identified in one other sample by TEM. In addition, one floor covering sample was found to contain asbestos by PLM at less than 1%. Asbestos was found at or greater than 1% in all nine pipe run insulation samples by PLM. During the asbestos sampling activity, other suspect materials observed were cementitious board within the utility rooms of the units.

The following practices should be observed with regard to the known and suspected asbestos-containing materials identified:

- The most significant risk of asbestos exposure to occupants is presented by the friable asbestos-containing pipe run insulation, which is in very poor condition and badly damaged. All damaged material should be repaired or removed in a planned, properly executed program, as soon as practical. If repairs are made, rather than removal, an Operations and Maintenance (O&M) Plan should be developed and implemented. This plan must described the locations

of all known ACM, procedures for its maintenance, repair and removal, and personnel responsible for its implementation. The O&M plan must remain in force until such time as all ACM is removed from the facility.

- The risks posed by the asbestos-containing dust in the ductwork cannot be clearly evaluated, because the sampling and analysis program only included a qualitative screening of this material since no approved quantitative procedure exists. Further studies, such as air sampling were recommended to determine if asbestos is becoming airborne and to define what risks, if any, are presented by these findings. These studies were subsequently performed and the findings are presented in this report.

- The vinyl floor coverings pose no significant risk as long as they are in good condition and are not damaged by excessive wear or misuse. They should be managed in place under an O&M program which describes procedures for the regular inspection of the floor coverings and the removal and replacement of any that become damaged.

Samples for airborne asbestos were collected from four wall or ceiling vents, one located in each of the living room, entry hallway, bedroom, and bathroom, in an unoccupied 2-story townhouse-type unit which had been inspected previously. In addition, an air sample was collected from the utility room using aggressive sampling techniques. The air samples were subjected to analysis by TEM to identify and quantify any asbestos fibers collected. The sample volumes collected resulted in detection limits for air airborne asbestos fiber concentrations of <0.004 fibers per cubic centimeter (f/cc). No airborne asbestos fibers were detected in the interior of this FHU property, by sampling techniques designed to approximate worst-case concentrations. By stirring up the dust in the utility room, where pipes had once been insulated with ACM, relatively high airborne asbestos fiber concentrations of 0.017 f/cc was found. This area should be cleaned by personnel trained in asbestos removal using a high-powered vacuum cleaner equipped with a high-efficiency particulate air (HEPA) filter, or other appropriate techniques.

SECTION 1. INTRODUCTION

SAMPLING AND ANALYSIS AT THE U.S. ARMY FAMILY HOUSING UNIT (FHU) PROPERTY CROOM, MARYLAND

SECTION 1. INTRODUCTION

Roy F. Weston, Inc. (WESTON) was retained by Argonne National Laboratory (ANL) to provide assistance in gathering additional environmental data for the U.S. Army Toxic and Hazardous Materials Agency (USATHAMA) at 53 family housing unit (FHU) properties in 12 states. The Croom, Maryland property is one of these FHUs.

1.1 PURPOSE AND SCOPE

The purpose of this project was to provide the Department of the Army with sound environmental data on the properties which are scheduled for sale or realignment as a result of the Defense Authorization Amendments and Base Closure and Realignment Act (Public Law 100-526). Environmental assessments of each property covered by the Act are required by the Secretary of Defense prior to their closure or realignment. Such actions must be performed in accordance with applicable provisions of the National Environmental Policy Act (NEPA) to ensure that any environmental hazards will be identified and mitigated where required.

Previously, ANL conducted enhanced preliminary assessments (PAs) for each property. These enhanced PAs made recommendations regarding sampling and analysis to determine (1) whether and in what quantities asbestos is present in certain building construction materials (including pipe run insulation, dust accumulated in heating ductwork, vinyl floor tile, and exterior siding shingles, where present), (2) in selected contexts, whether and in what concentration soils and groundwater may be contaminated, and (3) whether and in what range transformer oils at selected sites may contain polychlorinated biphenyls (PCBs). WESTON gathered this data by implementing ANL's Draft FHU Sampling and Analysis Plan, Revision 1 (SAP). Subsequent to the initial studies, WESTON, ANL, and USATHAMA decided that a follow-up effort was required to determine if asbestos fibers were becoming airborne from the dust in the heating system. This study was implemented, and samples were collected to evaluate any risks to occupants from this source.

1.2 SITE DESCRIPTION

The Croom housing area consists of 12 units located on 3.5 acres in Prince Georges County, Maryland, adjacent to the village of Croom. It is on the east side of Mt. Calvert Road, which intersects Maryland Rt. 382 (Croom Road) on the east; and is approximately four miles southeast of Upper Marlboro, Maryland. There are fences at the perimeter of the housing area, but the entrance is not guarded by a gate. Within the property, there is one short street, which ends in a small children's play area to the north. The three two-story apartment buildings are finished with brick and vinyl siding and are approximately 32 years old. Five apartments are two-bedroom units, and seven are three-bedroom units. The units are air conditioned and have fuel oil fired forced-air heating. One large storage shed is situated between a pumphouse and an elevated water storage tank and is used to store bulky items like lawn mowers. Separate storage sheds are located in the backyards of each individual unit.

1.3 REPORT ORGANIZATION

This report contains the results of the sampling and analysis program performed by WESTON. Section 2 contains a description of the asbestos sampling performed at the property and laboratory results for samples of suspected asbestos-containing material (ACM) collected. Copies of field notes and laboratory results pertaining to asbestos are provided in Appendices A.1 and A.2. Section 3 presents a description of the field sampling activities and results of the analyses for airborne asbestos fibers. Field notes and copies of the laboratory reports for this effort are presented in Appendices B.1 and B.2, respectively. Section 4 is a summation of all activities and findings for the Croom FHU.

SECTION 2. ASBESTOS-CONTAINING MATERIALS

SECTION 2. ASBESTOS-CONTAINING MATERIALS

WESTON personnel inspected three of the 12 units at the Croom family housing facility on 27 February 1990 for the presence of suspected ACM. Vinyl floor tile and sheeting, pipe run insulation, and dust accumulated within the heating ductwork were the only suspect materials found within the buildings that were sampled. All sampling was done following the requirements of ANL's SAP. Additionally, all field work was performed in accordance with applicable Federal regulations, including 40 CFR Part 61 Subpart M, 40 CFR Part 763 Subpart E, and 29 CFR Part 1910.1001.

2.1 SAMPLING RATIONALE

The sampling rationale used by WESTON for this project followed the recommendations set forth by ANL. The type of suspect ACM to be sampled, the number of housing units to be examined at each FHU facility, and number of samples to be taken for each material found were described in the SAP. The plan for Croom required sampling of the following materials, if present:

- Pipe run insulation.
- Accumulated dust inside heating ductwork if not sealed.
- Vinyl floor tiles.

In accordance with the SAP, three units were examined at this facility. The sampling plan, however, did not identify specific units which were to be sampled. The task of determining which housing units were representative of the facility as a whole and, therefore, would be sampled was left to the WESTON field team. After reviewing all available maintenance records and drawings and discussing the facility with Directorate of Engineering and Housing (DEH) personnel, it was determined that all of the units at the Croom FHU were similar in condition. Units 04B, 04D, and 09A, were chosen by the WESTON field team leader as representative units to be sampled.

The SAP specifies that a minimum of two pipe run insulation samples, four dust samples, and one sample of each color of floor tile be collected from each of the housing units examined. Twelve dust samples, nine pipe run insulation samples, and nine samples of vinyl floor coverings were collected at the facility.

2.2 FIELD ACTIVITIES AND OBSERVATIONS

Each of the units was inspected to determine if suspect materials were present. The samples of pipe run insulation were retrieved using a disposable coring device with a one-half inch diameter tube, designed such that the coring device also serves as the sampling containers. Before the coring tool was inserted, the materials to be sampled were moistened to prevent asbestos fibers from becoming airborne. The coring device was placed in its outer sample container and secured by a tight fitting lid. The containers were labeled with sample numbers, and shipped to the lab. The sampling tools were wiped clean with a damp cloth and all debris resulting from the sampling activities as collected and placed into plastic bags. The small bore hole was sealed with an encapsulant.

Three samples of pipe run insulation were taken in each unit. The pipe run insulation in all units examined was in very poor condition, having extensive physical damage and separation from the pipes. The pipe run insulation is friable, as defined in the Environmental Protection Agency (EPA) regulations, meaning that it can be crushed, crumbled, pulverized, or otherwise reduced to a powder using hand pressure. Friable ACM is considered to be more hazardous than non-friable ACM since it is much more likely to release asbestos fibers. Because of its friability and instances of damage, the pipe run insulation is considered to be the most hazardous type of ACM in the Croom FHU.

Heating ductwork vents in the units were not sealed, so dust samples were collected by wiping the inner surface of the duct near the designated exhaust vents with a fiber-free wipe selected for its ability to trap dust in a non-fibrous matrix. Each wipe was placed in the jaws of a flexible small parts pick-up tool and moistened with fiber free water. The grille was then removed and the tool inserted into the duct opening. The interior surface was wiped to collect dust on the moistened surface of the wipe. After the dust was gathered, the wipe was placed in a small plastic wide-mouth jar, sealed, labeled with the sample number, and shipped to the lab. The grille was then replaced and the tool was cleaned by rinsing and wet wiping the surfaces prior to collecting the next sample. Samples were collected from the living room, bedroom, entry, and main bathroom in all three units.

Brown 9" x 9" vinyl floor tile, two colors (brown and white) of 12" x 12" vinyl floor tile, and one color (yellow) vinyl sheeting were sampled. Units 04B and 09A contained white 12" x 12" floor tile. Units 04D and 09A contained brown 9" x 9" floor tile. Unit 04B also contained brown 12" x 12" floor tile. Units 04D and 04B contained yellow vinyl sheeting. One sample of each of the floor tile types was taken in each housing unit, resulting in a total of nine samples for laboratory determination of asbestos content. These samples were taken by breaking off a small piece of floor covering in an inconspicuous location. About one square inch of the tile surface area was taken for each sample. No effort was made to separate the mastic, which sometimes contains asbestos, from the floor covering samples themselves.

The vinyl floor coverings in all three of the units inspected was in good condition. This material is considered to be a non-friable type of ACM, unless damaged. If significant damage occurs, such that the material becomes friable as defined in the asbestos National Emission Standard for Hazardous Air Pollutants (NESHAP), the U. S. Environmental Protection Agency (EPA) would classify these tiles as friable materials. However, an EPA interpretation was recently released that changes certain previous interpretations regarding non-friable ACM. On 23 February 1990, a memorandum was issued by the Director of Emissions Standards Division, the Director of Stationary Source Compliance Division, and the Associate Enforcement Counsel for Air Enforcement of the EPA Office of Air Quality Planning and Standards (OAQPS). This memorandum was circulated to other air quality officials and EPA regional offices in early March 1990. This latest position states that floor tiles and certain other non-friable materials do not have to be removed from a facility prior to demolition, unless they are severely damaged and thus are considered friable, or unless the demolition may cause fiber release through grinding or abrasion of the tiles. Floor covering removal shall be done if demolition is to be accomplished by burning, either of the unit or of the debris from demolition. However, if the floors in the housing units are to be renovated, special care must be taken during the process to prevent the release of asbestos fibers.

The WESTON field team was directed, as a part of the project scope contained in the SAP, to perform sampling and analysis of specific suspect ACM. Other suspect materials observed was cementitous board (transite) in the heater rooms of the three units inspected. Copies of the field notes are included in Appendix A.1.

2.3 LABORATORY PROCEDURES AND RESULTS

The bulk samples of building materials were analyzed for asbestos content by WESTON's optical microscopy laboratory in Auburn, Alabama. This laboratory is accredited by the American Industrial Hygiene Association (AIHA) and the National Institute of Standards and Technology (NIST) under the National Voluntary Laboratory Accreditation Program (NVLAP). The bulk samples were analyzed by Polarized Light Microscopy (PLM) using the EPA's "Interim Method for the Determination of Asbestos in Bulk Insulation Samples", EPA 600/M4-82-020, December 1982. Copies of the laboratory reports are included in Appendix A.2.

Vinyl floor covering samples for which no asbestos was found using PLM methods and wipe samples of dust accumulated within heating ductwork were analyzed qualitatively for the presence of asbestos by Transmission Electron Microscopy (TEM) at WESTON's NVLAP accredited electron microscopy laboratory in Auburn, Alabama. Copies of these laboratory reports are also included in Appendix A.2.

All analyses were performed in accordance with protocols set forth in the Laboratory Accreditation package submitted by WESTON under NVLAP. This document includes standard procedures for sample analysis and quality assurance / quality control (QA/QC) which were acceptable to NIST. The QA/QC protocols for the laboratory differ significantly from those commonly found in chemical analysis procedures, due to the nature of the analytical procedure. Since there are no reagents, digestions, or other steps in the process that provide significant opportunities for sample contamination or analyte loss, lot blanks and sample spikes are not performed. Instead, all analyses are performed using the following steps:

- Incoming samples are divided into lots of ten for analysis.
- One sample is selected at random to serve as the QC check and divided into two containers.
- The sample lot is assigned to an analyst who determines the asbestos content of each sample.
- The QC sample is analyzed by a different analyst, designated by the sample custodian.
- The results of both analysts are submitted to the QC Coordinator for review, and comparison to the laboratory QC chart.
- The results are reviewed and approved, based on the written QC review procedures, or rejected. If rejected, the sample lot and QC sample are reanalyzed.

The WESTON laboratory routinely runs blank checks to ensure that equipment and refractive index oils are not contaminated, collects and analyzes samples of the air in the work areas to document that airborne asbestos fibers do not threaten worker health or contaminate samples, and analyzes samples submitted by NIST

proficiency checks are used for analyst training and to document analyst proficiency. The use of third party laboratory comparisons is often done, and is accomplished by sending duplicates of samples to an outside laboratory and comparing the results obtained by the two facilities.

In interpreting the asbestos results, it should be noted that the definition of asbestos presence differs between the EPA and some state agencies. According to the EPA definition, any materials that contain greater than one per cent (>1%) asbestos are classified as ACM by the 1977 NESHAP regulations. However, California has recently implemented state regulations that consider all materials containing 0.1 per cent or more asbestos as asbestos-containing. It is believed that several other states will soon follow the lead of California in lowering the threshold limit to 0.1 per cent, including some in which properties under review in this study are located. Currently the State of Maryland continues to abide by the EPA definition, hence, all samples containing >1% asbestos are considered to be ACM.

The matter is further complicated by the fact that the PLM method was developed specifically for friable materials, but not for non-friable types of suspect ACM such as vinyl floor coverings, vinyl sheeting, and siding. In fact, no specific method has been developed and promulgated to date for such samples, so laboratories use PLM as the only available documented procedure for their analysis. PLM has an inherent limitation on fiber resolution of about 0.25 micrometer (um) in diameter, while reliable detection and quantification of fibers smaller than 1 um in diameter is difficult. The manufacturing process for vinyl floor tiles, for example, often produces the very small fiber diameters which cannot be seen by PLM. WESTON's experience is that frequently such samples do, in fact, contain significant quantities of asbestos. WESTON has developed a qualitative technique using TEM to detect the presence of such small fibers and minimize false negatives in the laboratory results. This technique, however, does not allow a good quantitative estimate of asbestos content.

For these reasons, the WESTON laboratories have implemented a policy of reporting asbestos presence as follows:

- Asbestos determined by PLM to be present at greater than 1% is reported as the quantity detected.
- If asbestos is estimated to be less than 1% by PLM, it is reported as "<1%". This estimate of asbestos content may be made when only one asbestos structure is observed.
- If asbestos is not detected in certain non-friable materials by PLM, then the samples are subjected to TEM analysis. The results are reported as positive if asbestos is detected by TEM.

Recommendations made in this report are based on the >1% regulatory limit, except for floor tiles as discussed earlier and except as otherwise noted. However, all samples in which asbestos was detected are discussed. This represents a conservative approach to the assessment of asbestos presence at the facility.

Table 2.1 contains a summary of all samples collected at the Croom FHU, including sample locations, material descriptions, and laboratory results. PLM results are quantitative while TEM results are qualitative. Quantity estimates for materials sampled that were suspected to contain asbestos are presented in Table 2.2.

TABLE 2.1
BULK SAMPLE SUMMARY
CROOM FAMILY HOUSING

SAMPLE IDENTIFICATION	MATERIAL TYPE	LOCATION	ASBESTOS CONTENT PLM ANALYSIS	CONFIRMATION TEM ANALYSIS
Unit 04D				
BY312-24-MD-04D-ATD	Dust within ductwork	Bathroom	---	Positive
BY313-24-MD-04D-ATD	Dust within ductwork	Bedroom	---	Negative
BY314-24-MD-04D-ATD	Dust within ductwork	Entry	---	Negative
BY315-24-MD-04D-ATD	Dust within ductwork	Living room	---	Negative
BY316-24-MD-04D-API	Pipe run insulation	Heater room	Chrysotile, 10%	
BY317-24-MD-04D-API	Pipe run insulation	Heater room	Chrysotile, 5%	
BY318-24-MD-04D-AFT	Yellow vinyl sheeting	Living room, Hall	Chrysotile, 10%	
BY319-24-MD-04D-AFT	Brown 9" x 9" floor tile	Living room, Hall	Chrysotile, 7%	
BY320-24-MD-04D-AFT	Yellow vinyl sheeting	Bathroom	Chrysotile, 5%	
BY321-24-MD-04D-API	Pipe run insulation	Heater room	Chrysotile, 7%	
Unit 04B				
BY322-24-MD-04B-ATD	Dust within ductwork	Bathroom	---	Negative
BY323-24-MD-04B-ATD	Dust within ductwork	Bedroom	---	Negative
BY324-24-MD-04B-ATD	Dust within ductwork	Entry	---	Negative
BY325-24-MD-04B-ATD	Dust within ductwork	Living room	---	Negative
BY326-24-MD-04B-AFT	Brown 12" x 12" floor tile	Kitchen	None Detected	Negative
BY327-24-MD-04B-AFT	White 12" x 12" floor tile	Living room	Chrysotile, <1%	
BY328-24-MD-04B-AFT	Yellow vinyl sheeting	Bathroom	Chrysotile, 10%	
BY329-24-MD-04B-API	Pipe run insulation	Heater room	Chrysotile, 10%	
BY330-24-MD-04B-API	Pipe run insulation	Heater room	Chrysotile, 5%	
BY331-24-MD-04B-API	Pipe run insulation	Heater room	Chrysotile, 5%	
Unit 09A				
BY332-24-MD-09A-ATD	Dust within ductwork	Bathroom	---	Negative
BY333-24-MD-09A-ATD	Dust within ductwork	Bedroom	---	Negative
BY334-24-MD-09A-ATD	Dust within ductwork	Entry	---	Negative
BY335-24-MD-09A-ATD	Dust within ductwork	Kitchen	---	Negative
BY336-24-MD-09A-AFT	White 12" x 12" floor tile	Living room	None Detected	Positive
BY337-24-MD-09A-AFT	Brown 9" x 9" floor tile	Living room	Chrysotile, 2%	
BY338-24-MD-09A-API	Pipe run insulation	Heater room	Chrysotile, 20%	
BY339-24-MD-09A-API	Pipe run insulation	Heater room	Chrysotile, 5%	
BY340-24-MD-09A-API	Pipe run insulation	Heater room	Chrysotile, 5%	
BY341-24-MD-09A-AFT	White 12" x 12" floor tile	Bathroom	Chrysotile, 1%	

TABLE 2.2
ASBESTOS CONTAINING MATERIALS
CROOM FAMILY HOUSING

SAMPLE IDENTIFICATION	MATERIAL TYPE	LOCATION	QUANTITY	UNITS
Unit 04D				
BY312-24-MD-04D-ATD	Dust within ductwork	Bathroom	N/A	
BY316-24-MD-04D-API	Pipe run insulation	Heater room	15	Linear ft
BY317-24-MD-04D-API	Pipe run insulation	Heater room	N/A	
BY318-24-MD-04D-AFT	Yellow vinyl sheeting	Living room, Hall	240	Square ft
BY319-24-MD-04D-AFT	Brown 9" x 9" floor tile	Living room, Hall	240	Square ft
BY320-24-MD-04D-AFT	Yellow vinyl sheeting	Bathroom	40	Square ft
BY321-24-MD-04D-API	Pipe run insulation	Heater room	N/A	
Unit 04B				
BY327-24-MD-04B-AFT	White 12" x 12" floor tile	Living room	240	Square ft
BY328-24-MD-04B-AFT	Yellow vinyl sheeting	Bathroom	40	Square ft
BY329-24-MD-04B-API	Pipe run insulation	Heater room	15	Linear ft
BY330-24-MD-04B-API	Pipe run insulation	Heater room	N/A	
BY331-24-MD-04B-API	Pipe run insulation	Heater room	N/A	
Unit 09A				
BY336-24-MD-09A-AFT	White 12" x 12" floor tile	Living room	240	Square ft
BY337-24-MD-09A-AFT	Brown 9" x 9" floor tile	Living room	240	Square ft
BY338-24-MD-09A-API	Pipe run insulation	Heater room	15	Linear ft
BY339-24-MD-09A-API	Pipe run insulation	Heater room	N/A	
BY340-24-MD-09A-API	Pipe run insulation	Heater room	N/A	
BY341-24-MD-09A-AFT	White 12" x 12" floor tile	Bathroom	40	Square ft

The field notes describing the observations are provided in Appendix A.1, while copies of the original laboratory reports are included as Appendix A.2.

All nine samples of pipe run insulation were found to contain the chrysotile type of asbestos in a friable form at concentrations at or greater than 1% using the PLM technique for analysis. Based on these observations, the pipe run insulations should be considered to contain asbestos.

Six of the floor tile samples were found by PLM to contain asbestos at or greater than the 1% level. WESTON considers the 1% value reported for Sample BY-341-24-MD-09A-AFT to be sufficient to define the samples as asbestos-containing, due to the analytical uncertainty of the PLM method when applied to floor coverings, previously discussed. In addition, one sample was found to contain asbestos by PLM at <1%. One sample, for which no asbestos was reported following PLM analysis, was found to contain asbestos fibers by the TEM procedure. While this result is qualitative in nature, consideration of the process through which vinyl floor coverings were manufactured leads to the conclusion that this material should be treated as ACM. No detectable asbestos fibers were found in one sample by both PLM and TEM. Thus, eight of the nine vinyl floor covering samples were found to contain asbestos. The nine units not inspected should be considered to have ACM present in the floor covering unless additional sampling and analysis is performed and shows that no asbestos is present in these units.

Analytical results for the dust samples taken from the heater ductwork indicate that this dust contains some asbestos fibers. Qualitative TEM analyses revealed the presence of asbestos in one of the 12 dust samples. Samples from one unit had detectable asbestos fibers. These data lead to the conclusion that asbestos is found in the dust trapped by the heating ducts.

2.4 CONCLUSIONS AND RECOMMENDATIONS

The sample analyses performed by WESTON have revealed that asbestos is present in most floor tile samples collected in the three housing units examined, in pipe run insulation samples, and that the dust inside the heater supply ducts contains asbestos. These units are thought to be representative of the other nine at the site, but this was not confirmed by sampling all units.

Analytical results of the badly damaged pipe run insulation confirmed that asbestos is present in all nine of the samples taken. The insulation should be remediated in those units where asbestos-containing pipe run insulation is damaged by complete removal prior to sale or realignment, due to the location and condition of this material. Until all insulation containing asbestos is removed, an Operations and Maintenance (O&M) Plan should be developed and implemented. An O&M plan must address the following:

- The locations of all known and suspected ACM.
- The procedures and frequency for periodically assessing the ACM in the facility.
- The procedures for safely handling the ACM during maintenance or removal activities.
- Designation of an asbestos coordinator for the facility.

- The responsibilities and requirements for training of personnel involved with maintenance and renovation of the facility.

- The record-keeping program for the facility.

All of the asbestos-containing pipe run insulation must by removed prior to a planned renovation of the plumbing system or demolition of the units.

The asbestos dust accumulated within the heating ductwork represents an unusual problem, since the source of this asbestos is not readily apparent, and the quantity is not precisely known. As a conservative approach, the heating ductwork located within the concrete slab should be cleaned or permanently sealed when the units are renovated. Since the heating systems are currently operational, sealing the floor vents will require replacement with attic ducts and ceiling vents, or provisions of an alternate heating source. If the ducts are cleaned, a high-powered vacuum cleaner equipped with a high-efficiency particulate air (HEPA) filter should be employed, since other vacuum cleaners are not capable of trapping all of the small asbestos fibers that may be present.

The source of the asbestos in the ducts cannot be positively determined, due to the sampling and analysis procedures employed. However, there are several potential sources, based on observations at the numerous facilities inspected during this project. Units, presumed to be the original heaters, found at other facilities frequently contained an expansion joint which served to isolate the return air plenum from the heater itself, preventing the transmission of vibrations and noise to the ductwork. The fabric-like material used to form this joint was determined, in some cases, to be chrysotile asbestos in a nearly pure form. It is possible, even likely, that the heating systems in these units had similar expansion joints which have been removed. During the 25 to 30 years that the original units were in service, erosion of these joints was likely, and could have caused asbestos fibers to accumulate in the dust.

Another possibility is that residual debris from the removal of vinyl-asbestos floor coverings, such as was found in other sites, may have been left in the ducts during floor tile removal and replacement. Conversations with the TEM analysis indicate that there was some evidence of chlorine observed during the identification of the asbestos fibers by X-ray dispersion analysis in samples from some sites. The most likely source of this element, considering the site history, is the vinyl chloride polymer which forms the floor tile matrix. However, other asbestos sources, such as debris imported into the facilities from outside activities of the occupants, cannot be ruled out.

The vinyl floor coverings in the three housing units inspected were in good condition, but, should they become broken or damaged, asbestos fibers may be released. The recent EPA clarification of the definition for damaged non-friable materials apparently removes some concerns about the status of these materials at the time of renovation or demolition. Inspection of these normally non-friable materials prior to demolition is required, but, if they are in good condition at the time, they may be left in place as long as planned demolition procedures will not release a significant amount of asbestos fibers. However, if demolition will subject these non-friable materials to grinding, sanding, or abrading, or if demolition involves burning of the structure or debris from the structure, all forms of ACM, including these floor coverings, must be removed in advance.

The vinyl floor coverings should be left in place and managed under an O&M plan. The vinyl floor coverings should be removed during a planned renovation of the units, in accordance with the regulations applicable at the time. As an alternative, removal of these materials at present may be desirable, since the regulatory status of the material may be changed in the future.

Cementitious board in the heater rooms of each unit examined was the only other suspect material noted. This non-friable material appeared to have a transite-type facing and served as the movable divider separating the utility room from the storage area accessed from outside the unit. A hole had usually been cut in this board, ostensibly to permit entry of combustion or make-up air. This material should be managed under an O&M plan as long as it remains in place. Care should be taken during renovations or demolition to identify any suspect materials that may have been hidden from the view of the assessment team. The cementitious board observed by the field team, and any hidden suspect materials found later, should be analyzed for the presence of asbestos prior to being disturbed.

SECTION 3. AIRBORNE ASBESTOS ASSESSMENT

SECTION 3. AIRBORNE ASBESTOS ASSESSMENT

Sampling for airborne asbestos fibers was performed at one unit of the Croom, Maryland FHU on 26 April 1990 by WESTON. Dr. Leonard Nelms, a Certified Industrial Hygienist (CIH) visited the site and collected the samples using procedures described in the Asbestos Hazard Emergency Response Act (AHERA). These procedures were designed for verifying that clean-up of a contained area, following completion of an asbestos abatement action in public schools, was adequately performed. All samples were analyzed by TEM following the protocols specified in AHERA.

3.1 SAMPLING RATIONALE

WESTON followed the procedures and guidelines set forth during discussions among ANL, USATHAMA, and WESTON staff members, to provide a fast-track field sampling program and rapid analysis of samples collected. The urgency of this effort was driven by the finding that asbestos fibers were a component of the dust contained in the sub-slab ductwork of a number of the installations. The approach chosen required that the WESTON CIH collect four samples of air from selected heating registers, generally from one vent in each of the living room, kitchen, bedroom, and bathroom.

Air samples were to be collected in one unoccupied unit at the site while the heating system was operating, to simulate the worst possible case for exposure of occupants. The vacant unit selected was to be one of those from which dust within ducts had been sampled during the initial investigations, where possible. If no unit that had been sampled previously was vacant at the time, another unit was to be chosen from among those available, and samples of dust from the ducts were to be collected. These samples were to be collected after completion of sampling for airborne fibers, using the procedures employed previously. Unit 04D, a two-story townhouse-type unit was selected at the Croom site, since it was vacant and had previously been sampled. An additional sample was collected at this site, since there were findings of damaged ACM in the utility rooms.

3.2 FIELD ACTIVITIES AND OBSERVATIONS

The sampling activities at this site were performed during the afternoon, on a warm spring day. The diaphragm pumps were unpacked, placed in the selected sampling locations, and turned on as soon as possible after arrival at the site to allow the mechanical components to warm up prior to checking flow rates. Since there were no floor ducts in this unit and no duct at all in the kitchen, samples were taken from wall vents in the three remaining locations in the plan and from the ceiling vent in the hallway at the kitchen door. The heating system was turned on as soon as the pumps were in operation, to allow the air flow to stabilize, since it had not been in operation recently.

A test filter cassette, identical to those used for sample collection, was placed on the pump system being calibrated and the airflow into the filter was measured using a calibrated rotameter. This followed AHERA requirements and good industrial hygiene (IH) sampling protocols. After the pumps were calibrated, a sampling cassette made of an electrically conducting plastic was attached to the sample line, placed directly over the heating register to be sampled, and securely held in place with duct tape. The cassette contained a 25 mm diameter mixed cellulose ester (MCE) membrane filter, having a nominal pore size of 0.45 um. The

time at which sample collection was begun was recorded and the air was sampled for approximately three hours.

The pumps were operated for a length of time sufficient to draw about 1,600 liters (L) of air through each filter, based on the initial daily calibration. At the expiration of this time, the filter cassettes were removed from the heating register, inverted while the airflow continued, and lightly tapped to dislodge any fibers that may have adhered to the cowling of the cassette. Then, the cassettes were carefully removed from the sampling pump, resealed with the plugs and end caps that are a part of the cassettes, and labeled. The flow rate of each pump was again determined by exactly the same procedure used prior to the start of sample collection. After all sampling was completed, the heating system was returned to the same condition and setting that was found on entry to the unit.

The volume of air drawn through each filter was calculated, based on the average sample flow rate and the duration of sample collection, and recorded on the cassette label. Each cassette was then sealed in a anti-static plastic zipper-seal bag and placed in a shipping carton with a custom-designed anti-static foam liner. All sampling equipment, samples and other gear were then removed from the unit and the site was secured prior to departure.

Samples were collected from the four interior locations selected and described earlier, as well as from the utility room. While sampling in the utility room, dust settled on the floor and other surfaces was stirred up by manually causing air to blow across these areas. The was done to simulate activity in the utility room and to determine if the damaged insulation had released fibers into the dust. In addition, a background sample of ambient outside air was taken near the entry door to the kitchen and a field blank was prepared. No significant problems were encountered during the sample collection activities.

During the sampling effort the facility was examined to identify any potential sources of asbestos associated with the heating system that may be responsible for the asbestos fibers found in the dust. No other suspect ACM was readily identified in the heating furnace or ductwork of this unit at the time of sample collection. However, a relatively new furnace was present indicating that the system had been renovated.

3.3 LABORATORY PROCEDURES AND RESULTS

Samples were shipped to the laboratory soon after collection by common carrier. The five samples of air from within the unit were analyzed by WESTON's NVLAP-accredited TEM facility, using the sample preparation and analytical procedures set forth in the EPA AHERA method. A section of the exposed filter was cut from each sample and three wedges were placed on copper wire grids for TEM mounting. The samples were etched in a plasma asher, which also destroyed some of the organic materials that may have been collected, and vacuum-coated with a thin layer of carbon, embedding the fibers that were on the filter surface. Each carbon-coated grid was placed in a Jaffe wick washer, in which the MCE filter matrix was dissolved and wicked away, leaving behind the carbon film containing any asbestos fibers collected. The grids were then examined and found to be ready for analysis.

Once the sample grids were prepared, each grid was examined by the TEM protocols of AHERA. A specified number of grid openings were scanned looking for fibers that may be asbestos. Typically, between six and ten grid openings had to be examined to comply with the detection limit of 0.005 fibers per cubic

centimeter (f/cc) set forth in the regulations. Whenever a fiber was observed during this examination, the microscopist examined its morphology and determined its elemental composition from the emitted X-ray spectrum. If these indicated that it may be an asbestiform mineral, the crystal lattice structure was examined by observation of its electron diffraction pattern. The fiber was then classified either by the type of asbestos determined to be present during the analysis, or as a non-asbestos fiber.

The results for the four samples from inside Unit 04D are presented in Table 3.1. No asbestos fibers were detected in any of these samples at a limit of detection that was between 0.003 and 0.0045 fibers per cubic centimeter (f/cc). However, the sample taken from inside the utility room during activities that deliberately stirred up the settled dust contained a significant number of asbestos fibers. Based on these findings, the background sample and field blank were examined, to document that there were no asbestos fibers present in the background.

3.4 CONCLUSIONS AND RECOMMENDATIONS

The air samples collected inside the unit indicate that none of the asbestos fibers from the dust found within the heating system ductwork are being released in significant quantities at this facility. No airborne asbestos fibers were found in the air flowing from the heating duct vents, at a concentration that was greater than the detection limit. The limits of detection were <0.005 f/cc, which is below the acceptability limit set forth in AHERA for clearance of an abatement area in a school, and were far lower than the OSHA Permissible Exposure Limit (PEL) for workers of 0.2 f/cc.

The sample taken using aggressive techniques to stir up the dust in the utility room was found top contain a total of 0.017 f/cc. This level is about 10% of the OSHA PEL, and was easily generated by stirring up the dust. In fact, since the sampling pump was running during the period when the other samples were being collected, the air volume pulled while aggressively sampling was probably less than 20% of the total volume collected. If this factor is incorporated, the airborne asbestos level in the utility room was probably near the OSHA PEL when stirred up.

While asbestos has been shown to pose a health risk to humans at high fiber concentrations, there are no definitive studies that indicate that a risk is associated with low-level airborne exposures such as the 0.005 f/cc AHERA limit. Therefore, sampling and analysis for airborne asbestos within the unit at this site did not reveal any health risk to the occupants, based on the TEM analyses of the samples collected. However, it is recommended by the U.S. Army Environmental Hygiene Agency (AEHA) that, if the units are to remain under the management, operational control, or ownership of the Army, additional sampling and analysis for airborne asbestos be undertaken. These studies should be performed to provide data from at least ten percent or a minimum of three of the housing units, whichever is greater. This additional sampling and analysis effort, along with the other recommended actions, will help to ensure that there is no long-term exposure risk to the occupants or to maintenance personnel.

TABLE 3.1. RESULTS OF AIRBORNE ASBESTOS SAMPLING AND ANALYSIS
CROOM, PA FAMILY HOUSING UNITS
(ALL VALUES IN FIBERS/CC)

SAMPLE NUMBER	SAMPLE LOCATION	ASBESTOS IN DUST	ASBESTOS CONCENTRATION	ASBESTOS TYPE FOUND
CR-04D-LR	Living Room	NO	ND <0.004	ND
CR-04D-HA	Hallway	NO	ND <0.004	ND
CR-04D-BR	Bedroom	NO	ND <0.004	ND
CR-04D-BA	Bathroom	YES	ND <0.004	ND
CR-04D-UT	Utility Room	--	0.017	Chrysotile
CR-04D-OUT	Outside	--	ND <0.004	ND
CR-04D-FB	Field Blank	--	ND NA	ND

ND = Not Detected at the Limit of Detection Cited.
Note: The asbestos in all dust samples was chrysotile.

On the other hand, a high concentration of airborne asbestos was easily generated by stirring up the dust present in the utility room. The asbestos is probably due to debris on the floor which originated from the "air-cell" pipe insulation. Removal of this dust by vacuuming using a HEPA-equipped system is recommended as a prudent course of action, since the dust remains in a location where it can be easily disturbed by occupants of the unit or maintenance personnel, possibly generating high concentrations of airborne asbestos fibers.

SECTION 4. SUMMARY OF FINDINGS

SECTION 4. SUMMARY OF FINDINGS

Sampling and analyses performed at the Croom, Maryland FHU reveal the presence of several issues of concern from an environmental standpoint. The most significant are the detection of asbestos in 1 of the 12 dust samples, in all nine pipe insulation samples, and in all of the nine samples of floor tile. In addition, the high level of airborne asbestos fibers found in the utility room during aggressive sampling indicates the presence of a potential risk to occupants and maintenance personnel.

The following practices should be observed with regard to the known and suspected asbestos-containing materials identified:

- The friable asbestos-containing pipe insulation presents the greatest concern at this site. The general condition of this ACM is very poor and badly damaged. This material should be removed and replaced with an asbestos substitute. This action should be done by qualified personnel in accordance with state and Federal regulations.

- The vinyl floor coverings and cementitious board pose no significant risk as long as they are in good condition and are not damaged by excessive wear or misuse. They should be left in place and managed under an O&M program which describes procedures for the regular inspection of these materials and the removal and replacement of any that become damaged.

- Additional sampling and analysis for airborne asbestos at this site is recommended by AEHA, if the units are to remain under the management, operational control, or ownership of the Army. These studies should be performed to provide data from at least ten percent or a minimum of three of the housing units, whichever is greater.

The air monitoring performed in Unit 04D indicated that no detectable asbestos was being emitted in air from dust collected from the heating ducts inside the unit. The detection limit of the method, <0.004 f/cc, is below the AHERA limit and well below the OSHA PEL of 0.2 f/cc. However, the dust stirred up in the utility room contained a significant number of asbestos fibers. The level during the period of aggressive sampling may have been near or reached the OSHA PEL. The dust in this unit should be removed by vacuuming using a HEPA-equipped system as a prudent course of action. The dust remains in a location where it can be easily disturbed by occupants of the unit or maintenance personnel, possibly generating high concentrations of airborne asbestos fibers.

APPENDIX A.1. FIELD DATA, ASBESTOS SAMPLING

0597

SITE SURVEY LOG

CLIENT Argonne National Labs WESTON WORK ORDER NO. 2104-13-01

FACILITY/BLDG. NO. CROOM FHU 4D SITE #24

FACILITY CONTACT Kay Keith TELEPHONE NUMBER 703 202-693-3557

TECHNICIAN NAME L. Jaye SIGNATURE Noland F Jaye

TECHNICIAN NAME A. Busby SIGNATURE Arthur W. Busby

TIME ARRIVED 1030 TIME DEPARTED 1130 DATE 27 /FEB/90
dd mmm yy

SPECIFIC SITE ACTIVITIES, COMMENTS, INTERVIEW RESULTS & BRIEF DESCRIPTION OF FACILITY

Unit 4D is a two-bedroom apartment. The roof is flat, gravel and brick & wood siding. There is sheet vinyl flooring over old existing tile on the first floor. Upstairs has hardwood floors except for bathroom. Heat is forced air oil fire. Samples of floor tile, pipe insulation and dust in air vents were taken. There was transite wall board in utility room adjacent to heater. This unit was recently vacated.

The TRANSITE Board near the heater has a hole cut in the center so air may be drawn in from the outside. The transite board has some damage around the edges from being slid back and fourth to gain access to the heater. This is the case with all of the heater rooms at the Croom FHU.

ACTIVITY CHECKLIST

Interviews Completed	✓	Number of Samples	10
Drawings Reviewed	✓	Survey Form Completed	✓
Drawings Attached	✓	Site Log Completed	✓
Visual Inspection	✓	Chain-of-Custody Initiated	✓
Number of Photos	3	Exp. Assess. Form Init.	✓

Q.A. Check ____ SIGNATURE ____ DATE ____/____/90
dd mmm yy

SITE SURVEY LOG

(Continued)

The pipe insulation in all of these units is in very bad condition and is hanging loose in some places. There is alot of old fiber glass insulation laying on the floors in the mech rooms and may be covering up some wrap debris.

ASBESTOS SURVEY DATA

0599

BLDG. NO.: 014D
INSTALLATION 024

TASK TEAM MEMBERS
L. Jaye
A. Busby

W.O. No. 2104-13-01
CLIENT: ARGONNE NATIONAL LAB

BLDG. NAME: CROOM FHU.
BLDG. DESCRIPTION: 2 bedroom, brick apartment

DATE (dd/mm/yy): 27/FEB/90
TIME ARRIVED: 1030

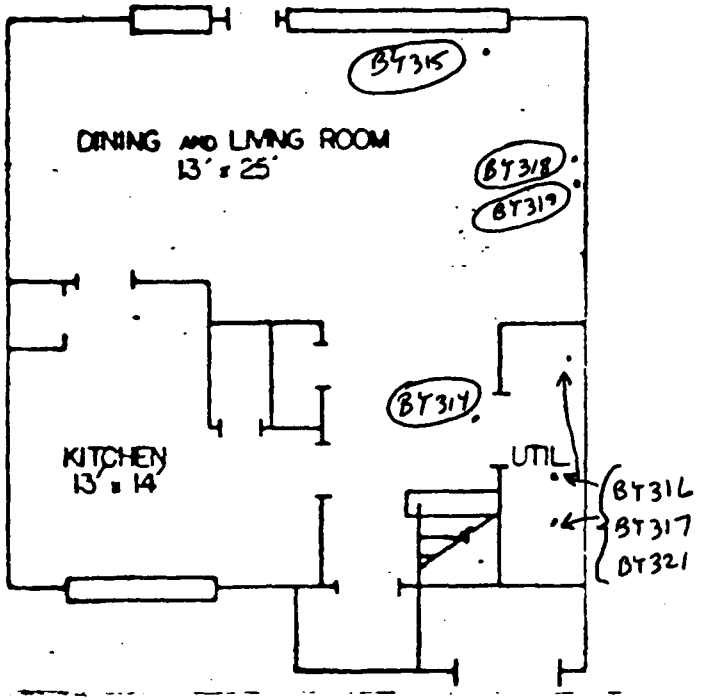
ITEM NO.	LAB SAMPLE NO.	BASE NO.	STATE	UNIT NO.	SAMPLE CODE	AREA	QUANTITY	PHOTO	E.A. FORM NO.	NOTES
1.	BY3112	214	MD	014D	AITD	BATHROOM	1		109181A	01
2.	BY3113	214	MD	014D	AITD	BEDROOM	1		109181A	01
3.	BY3114	214	MD	014D	AITD	ENTRY	1		109181A	01
4.	BY3115	214	MD	014D	AITD	LIVING ROOM	1		109181A	01
5.	BY3116	214	MD	014D	AIPI	HEATER ROOM	15	✓	109181B	02
6.	BY3117	214	MD	014D	AIPI	HEATER ROOM	1	✓	109181B	03
7.	BY3121	214	MD	014D	AIPI	HEATER ROOM	1	✓	109181B	03
8.	BY3118	214	MD	014D	AIFI	LIVING ROOM	2HP			04
9.	BY3119	214	MD	014D	AIFI	LIVING ROOM	2HP			05
10.	BY3120	214	MD	014D	AIFI	BATHROOM	49			06
11.					AI					
12.					AI					

NOTE NO.	NOTES/REMARKS/COMMENTS/DETAILS/OTHER MATERIALS, QUANTITY, ETC
01	Dust Sample from wall vent
02	Pipe insulation (Linear feet)
03	Same material as BY316
04	Yellow Sheet vinyl flooring LR, hall (Square feet)
05	Brown 9x9 floor tile beneath Yellow flooring
06	Yellow Sheet vinyl flooring (Square feet)

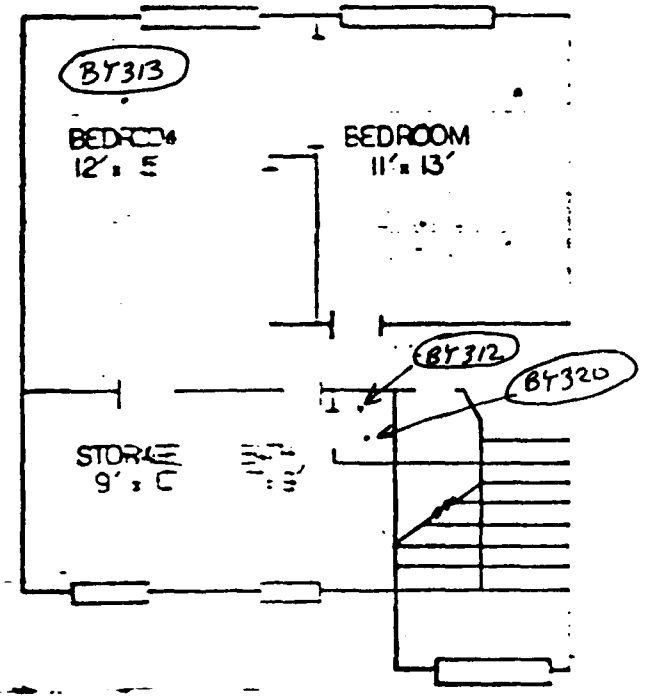
TECHNICIAN SIGNATURE J. Jaye

QUALITY ASSURANCE SIGNATURE

CRoom # 4D



FIRST FLOOR PLAN



SECOND FLOOR PLAN

14000 AREA (WOODBRIDGE)
2 BR - TWO STORY
QTRS. 14000, 14004 [illegible]

SITE #24
BLDG #4D
CROOM, MD

0691

SITE SURVEY LOG

CLIENT Argonne National Labs WESTON WORK ORDER NO. 2104-13-01

FACILITY/BLDG. NO. CROOM FH4 04B

FACILITY CONTACT Kay Keith TELEPHONE NUMBER 103 202-696-3557

TECHNICIAN NAME L. Jaye SIGNATURE Nolan L Jaye

TECHNICIAN NAME A. Busby SIGNATURE Arthur M. Busby

TIME ARRIVED 1130 TIME DEPARTED 1200 DATE 27/FEB/90
dd mmm yy

SPECIFIC SITE ACTIVITIES, COMMENTS, INTERVIEW RESULTS & BRIEF DESCRIPTION OF FACILITY

Unit 4B is a 3-bedroom apartment. The roof is flat, gravel and outside is brick. Downstairs has vinyl floor tile and upstairs is hardwood floor. Heat is ~~from~~ forced air oil fire. Samples of floor tile, pipe insulation and dust from air vents were taken. Unit was empty and unoccupied at the time of our inspection.

ACTIVITY CHECKLIST

Interviews Completed	✓	Number of Samples	10
Drawings Reviewed	✓	Survey Form Completed	✓
Drawings Attached	✓	Site Log Completed	✓
Visual Inspection	✓	Chain-of-Custody Initiated	✓
Number of Photos	3	Exp. Assess. Form Init.	✓

Q.A. Check _____ SIGNATURE _____ DATE ___/___/90
dd mmm yy

WESTON

ASBESTOS SURVEY DATA

0693

BLDG. NO.: 014B
INSTALLATION 0214

TASK TEAM MEMBERS
L. Jaye
A. Busby

W.O. No. 2104-13-01
CLIENT: ARGONNE NATIONAL LAB

BLDG. NAME: CRoom, MD F#4
BLDG. DESCRIPTION: 2-bedroom, brick apartment

DATE (dd/mm/yy): 27/FEB/90
TIME ARRIVED: 1130

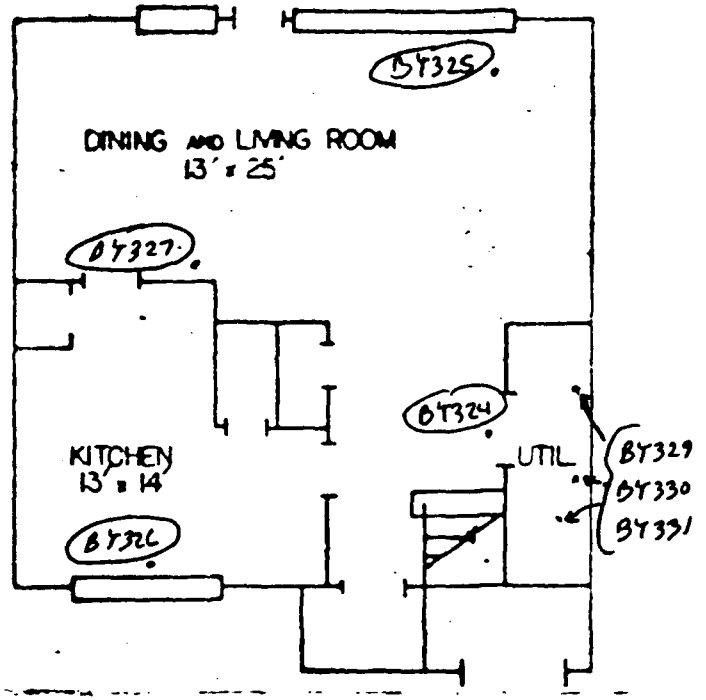
ITEM NO.	LAB SAMPLE NO.	BASE NO.	STATE	UNIT NO.	SAMPLE CODE	AREA	QUANTITY	PHOTO	E.A. FORM NO.	NOTES
1.	BY3312-214-MD-014B-AITD					BATHROOM	111		10991A	01
2.	BY3313-214-MD-014B-AITD					BEDROOM	111		10991A	01
3.	BY3314-214-MD-014B-AITD					ENTRY	111		10991A	01
4.	BY3315-214-MD-014B-AITD					LIVING ROOM	111		10991A	01
5.	BY3316-214-MD-014B-AIFT					KITCHEN	170		10991B	02
6.	BY3317-214-MD-014B-AIFT					LIVING ROOM	340		10991C	03
7.	BY3318-214-MD-014B-AIFT					BATHROOM	40		10991D	04
8.	BY3319-214-MD-014B-AIPI					HEATER ROOM	15	✓	10991E	05
9.	BY3320-214-MD-014B-AIPI					HEATER ROOM	111	✓	10991E	06
10.	BY3321-214-MD-014B-AIPI					HEATER ROOM	111	✓	10991E	06
11.		-21-	-	-	-AI					
12.		-	-	-	-AI					

NOTE NO.	NOTES/REMARKS/COMMENTS/DETAILS/OTHER MATERIALS, QUANTITY, ETC.
01	Dust samples in air vents
02	Brown 12X12 floor tile (Square feet)
03	White 12X12 floor tile (Square feet)
04	Yellow vinyl flooring (Square feet)
05	Pipe insulation (Linear feet)
06	Same material as BY329

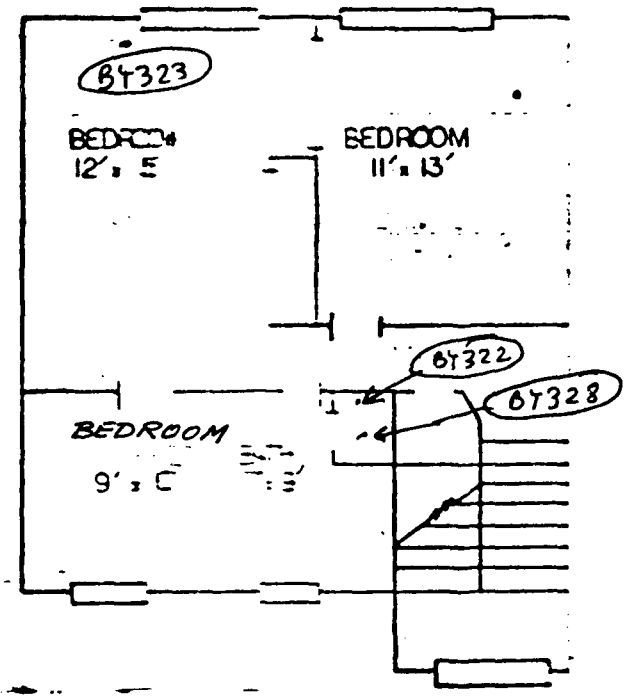
TECHNICIAN SIGNATURE Nola L Jaye

QUALITY ASSURANCE SIGNATURE

Croom # 4B



FIRST FLOOR PLAN



SECOND FLOOR PLAN

14000 AREA (WOODSIDE)
2 BR - TWO STORY
QTRS. 14000, 14004 SERIES

SITE #24
BLDG #4B
CROOM, MD

0605

SITE SURVEY LOG

CLIENT Argonne National Labs WESTON WORK ORDER NO. 2104-13-01

FACILITY/BLDG. NO. CROOM FH4 9A

FACILITY CONTACT Kay Keith TELEPHONE NUMBER 703 202-698-3557

TECHNICIAN NAME L. Jaye SIGNATURE Nolan L. Jaye

TECHNICIAN NAME A. Busby SIGNATURE Arthur M. Busby

TIME ARRIVED 1200 TIME DEPARTED 1230 DATE 27 FEB/90
dd mmm yy

SPECIFIC SITE ACTIVITIES, COMMENTS, INTERVIEW RESULTS & BRIEF DESCRIPTION OF FACILITY

Unit # 09A is a 2-bedroom brick apartment. The downstairs living room and kitchen has vinyl floor tile. The upstairs bedroom area has hardwood floors. The heat is forced air oil fire. Samples of pipe insulation, floor tile and dust from air vents were taken. Transite board (9 sq') was found in utility room behind heater. This unit was occupied at the time of our inspection.

ACTIVITY CHECKLIST

Interviews Completed	✓	Number of Samples	10
Drawings Reviewed	✓	Survey Form Completed	✓
Drawings Attached	✓	Site Log Completed	✓
Visual Inspection	✓	Chain-of-Custody Initiated	✓
Number of Photos	3	Exp. Assess. Form Init.	✓

Q.A. Check ____ SIGNATURE ____ DATE ____/____/90
dd mmm yy

ASBESTOS SURVEY DATA

069

BLDG. NO.: 0191A
INSTALLATION 0214

TASK TEAM MEMBERS
L. Jaye
A. Busby

W.O. No. 2104-13-01
CLIENT: ARGONNE NATIONAL LAB

BLDG. NAME: CROOM, MD FH4.
BLDG. DESCRIPTION: 2-bedroom brick apartment

DATE (dd/mm/yy): 27/FEB/90
TIME ARRIVED: 1200

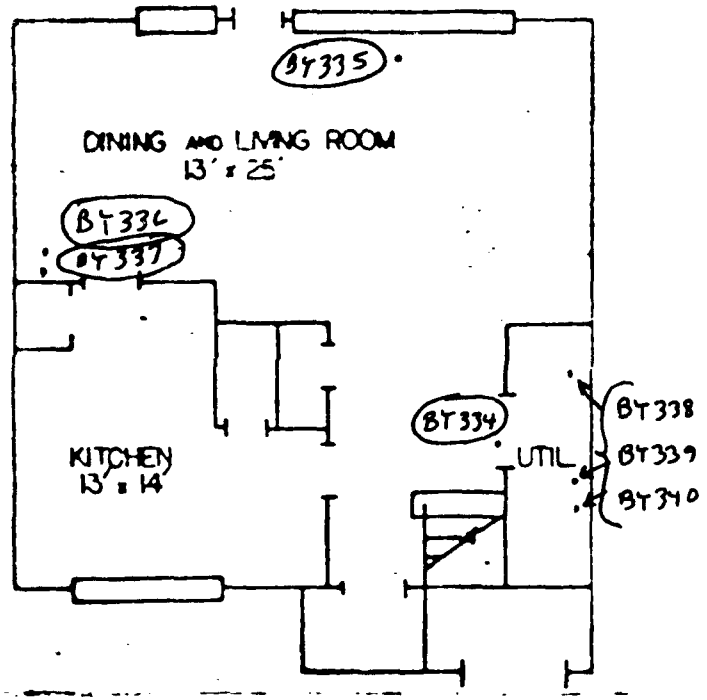
ITEM NO.	LAB SAMPLE NO.	BASE NO.	STATE	UNIT NO.	SAMPLE CODE	AREA	QUANTITY	PHOTO	E.A. FORM NO.	NOTES
1.	B47332	214	MD	0191A	AITD	BATHROOM	111	_	111010A	01
2.	B47333	214	MD	0191A	AITD	BEDROOM	111	_	111010A	01
3.	B47334	214	MD	0191A	AITD	ENTIRY	111	_	111010A	01
4.	B47335	214	MD	0191A	AITD	KITCHEN	111	_	111010A	01
5.	B47336	214	MD	0191A	AIFT	LIVING ROOM	240	_	111010B	02
6.	B47337	214	MD	0191A	AIFT	LIVING ROOM	240	_	111010C	03
7.	B47341	214	MD	0191A	AIFT	BATHROOM	140	_	111010D	04
8.	B47338	214	MD	0191A	AIPI	HEATER ROOM	15	✓	111001E	05
9.	B47339	214	MD	0191A	AIPI	HEATER ROOM	11	✓	111001E	06
10.	B47340	214	MD	0191A	AIPI	HEATER ROOM	111	✓	111010E	06
11.	____	_	_	_	AI		___	_	____	_
12.	____	_	_	_	AI		___	_	____	_

NOTE NO.	NOTES/REMARKS/COMMENTS/DETAILS/OTHER MATERIALS, QUANTITY, ETC.
01	Dust Samples from air vents
02	White 12x12 floor tile (Square feet)
03	Brown 9x9 floor tile beneath B47336 (Square feet)
04	White 12x12 floor tile (Sq feet)
05	Pipe insulation (Linear feet)
06	Same material as B47338

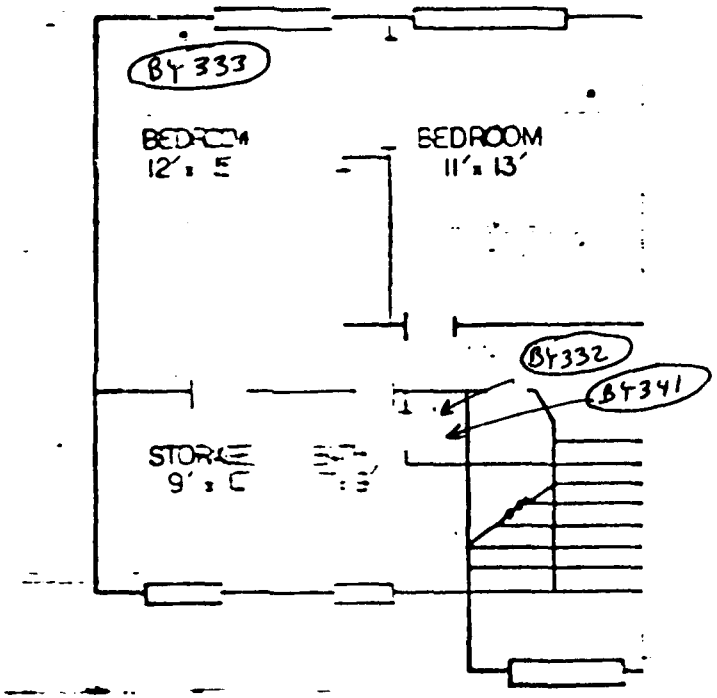
TECHNICIAN SIGNATURE _____

QUALITY ASSURANCE SIGNATURE _____

CRoom # 9A



FIRST FLOOR PLAN



SECOND FLOOR PLAN

14000 AREA (WOODRIDGE)
2 BR - TWO STORY
QTRS. 14000, 14004 [illegible]

SITE # 24
BLDG # 9A
CROOM, MD

APPENDIX A.2. LABORATORY DATA, ASBESTOS SAMPLES

BULK SAMPLE ANALYSIS SUMMARY

Weston W.O. No. 2104-13-01-0000

Sample Number BY316 through Sample BY341

AO LAB ID NO	CLIENT/CLIENT ID	LOCATION	MATERIAL DESCRIPTION*	DATE RECEIVED	RESULTS** CH	AM	CR	OT	TL	LAYERS	ANALYST
BY316	24-MD-04D-API	HEATRM	F, PIPE INSUL	03/01/90	10	ND	ND	ND	10	Yes	07323
BY317	24-MD-04D-API	HEATRM	F, PIPE INSUL	03/01/90	5	ND	ND	ND	5	Yes	06072
BY318	24-MD-04D-AFT	LIVNRM	NF, YL, SHT VINYL	03/01/90	10	ND	ND	ND	10	Yes	06072
BY319	24-MD-04D-AFT	LIVNRM	NF, BR, 9X9 FT	03/01/90	7	ND	ND	ND	7	Yes	06072
BY320	24-MD-04D-AFT	BATHRM	NF, YL, SHT VINYL	03/01/90	5	ND	ND	ND	5	Yes	06072
BY321	24-MD-04D-API	HEATRM	F, PIPE INSUL	03/01/90	7	ND	ND	ND	7	Yes	06072
BY326	24-MD-04B-AFT	KITCHN	NF, BR, 12X12 FT	03/01/90	ND	ND	ND	ND	ND	No	06072
BY327	24-MD-04B-AFT	LIVNRM	NF, WH, 12X12 FT	03/01/90	<1	ND	ND	ND	<1	Yes	06072
BY328	24-MD-04B-AFT	BATHRM	NF, YL, VINYL FLR	03/01/90	10	ND	ND	ND	10	Yes	06072
BY329	24-MD-04B-API	HEATRM	F, PIPE INSUL	03/01/90	10	ND	ND	ND	10	Yes	06806
BY330	24-MD-04B-API	HEATRM	F, PIPE INSUL	03/01/90	5	ND	ND	ND	5	Yes	06806
BY331	24-MD-04B-API	HEATRM	F, PIPE INSUL	03/01/90	5	ND	ND	ND	5	Yes	06806
BY336	24-MD-09A-AFT	LIVNRM	NF, WH, 12X12 FT	03/01/90	ND	ND	ND	ND	ND	No	06806
BY337	24-MD-09A-AFT	LIVNRM	NF, BR, 9X9 FT	03/01/90	2	ND	ND	ND	2	No	06806
BY338	24-MD-09A-API	HEATRM	F, PIPE INSUL	03/01/90	20	ND	ND	ND	20	Yes	06806
BY339	24-MD-09A-API	HEATRM	F, PIPE INSUL	03/01/90	5	ND	ND	ND	5	Yes	06806
BY340	24-MD-09A-API	HEATRM	F, PIPE INSUL	03/01/90	5	ND	ND	ND	5	Yes	06806
BY341	24-MD-09A-AFT	BATHRM	NF, WH, 12X12 FT	03/01/90	1	ND	ND	ND	1	No	06806

* MATERIAL DESCRIPTION

Friable[1], Color[2], System[3], Type

** RESULTS

CH - Chrysotile
AM - Amosite
CR - Crocidolite
OT - Other
TL - Total

FRIABLE[1]

F - Friable
NF - Non-Friable

COLOR[2]

BK - Black
BL - Blue
BR - Brown
GR - Green
GY - Gray
RD - Red
TN - Tan
WH - White
YL - Yellow

SYSTEM[3]

CHW - Chilled Water
DOM - Domestic Water
HHW - Heating Hot Water
STM - Steam
UNK - Unknown

All analyses are performed in accordance with the methods set forth in U.S. EPA 600/M4-82-020, as ammended. Weston's Optical Microscopy Laboratory is accredited by the National Institute of Standards and Technology's National Voluntary Laboratory Accreditation Program for asbestos fiber analysis (Laboratory Code 1254).

ROY F. WESTON, INC.
1635 PUMPHREY AVE.
AUBURN, AL 36830
PHONE: (205) 826-6100
FAX: (205) 826-8232

Transmission Electron Microscopy
Asbestos Summary Report

Client: Argonne National Laboratories Weston W.O. No.: 2104-13-01-0000

Sample Type(s): Dust and Floor Tiles Sampling Location: Croom

QUALITATIVE ANALYSIS

FLOOR TILES: A 0.5 to 2.0 gram portion of each floor tile sample was ultrasonically disaggregated in four milliliters of deionized, 0.2 μm membrane filtered water. After the coarse fraction settled, a drop of the suspended, clay-sized fraction was placed on a Formvar coated 200 mesh Cu TEM grid and allowed to dry. The grid was carbon coated for thermal stability in the electron beam and examined with a Philips CM12 transmission electron microscope operating at 120 kilovolts accelerating voltage.

DUST WIPE SAMPLES: A generous loading of dust was collected on a pre-wetted, 25 square centimeter section of a cleanroom wipe. The wipe was placed in a two ounce wide mouth collection vial and returned to the laboratory. Ten to fifteen milliliters of filtered, deionized water was added to suspend the dust. The suspension was ultrasonically dispersed and the coarse fraction was allowed to settle. A drop of the suspension was placed on a Formvar coated 200 mesh Cu TEM grid and allowed to dry. The grid was carbon coated as above and examined by transmission electron microscopy at 120 kilovolts accelerating voltage.

ANALYTICAL RESULTS

SAMPLE IDENTIFICATION	RESULTS
BY312-24-MD-04D-ATD	Positive
BY313-24-MD-04D-ATD	Negative
BY314-24-MD-04D-ATD	Negative
BY315-24-MD-04D-ATD	Negative
BY322-24-MD-04B-ATD	Negative
BY323-24-MD-04B-ATD	Negative

ROY F. WESTON, INC.
1635 PUMPHREY AVE.
AUBURN, AL 36830
PHONE: (205) 826-6100
FAX: (205) 826-8232

ANALYTICAL RESULTS
(continued)

SAMPLE IDENTIFICATION	RESULTS
BY324-24-MD-04B-ATD	Negative
BY325-24-MD-04B-ATD	Negative
BY326-24-MD-04B-AFT	Negative
BY332-24-MD-09A-ATD	Negative
BY333-24-MD-09A-ATD	Negative
BY334-24-MD-09A-ATD	Negative
BY335-24-MD-09A-ATD	Negative
BY336-24-MD-09A-AFT	Positive

Barry Rayfield
(Approved for Transmittal)

3/19/90
(Date)

* This test report relates only to the specific items tested.
** These sample results may only be reproduced in full, and are valid only if approved for transmittal.

APPENDIX B.1. FIELD DATA
AIRBORNE ASBESTOS SAMPLING

FIELD NOTES FOR CROOM MARYLAND

The Croom MD site is a series of three buildings, two-story construction with town-house type units. The air sampling was done in Unit 4-D which is nearest to the road and on the end. The unit had a brick and vinyl siding exterior with asphalt shingle roof. The interior was finished in gypsum wall board with 12 x 12 vinyl floor tile on the lower level. This floor tile was a light tan or beige with light streaks. The upstairs floors and the stairwell were hardwood. The lower level contained the living room/dining room area as one large room, the kitchen and the entry hall. The upper level contained the bathroom, a master bedroom with a large storage room which could be used as an infants bedroom and a smaller second bedroom. Samples were collected from the same ducts that had been sampled during the asbestos portion of the survey. These included the vent in the ceiling in the hallway, a wall vent nearby in the living room, the bathroom vent in the wall beneath the sink, and the master bedroom vent which was in the center wall dividing the two bedrooms. Two other sample were collected. An outside sample was collected from the kitchen window over the sink and another sample was collected in the mechanical room. The mechanical room in these units contained the hot water heater and the heating unit. A small storage shed opening to the outside is also connected to this through a doorway. In Unit 4D the outer storage room was closed off by a door which slid on the floor but was not attached to anything. The pipe insulation in this small outer room was fiberglass loosely wrapped around the pipes. It appeared that this had been done on an emergency basis or for some reason that did not allow for standard insulation to be placed on. The insulation on the piping inside the mechanical room appeared to be aircell and has been sampled as a part of the asbestos survey program. After sampling was completed in the rest of the house, the dust in these two rooms was stirred up by using a newspaper and a board which was present in one of the rooms as a fan. This was done on three

periods approximately ten minutes apart to ensure that a sample collected from this utility room was representative of what would happen in the worst case if the dust was disturbed. Sampling was begun at this site at approximately 1:15 p.m. and was concluded at about 5:00 p.m. Equipment was packed, samples were prepared for shipment, and chain-of-custody was filled out. The site was departed at approximately 5:15 p.m.

AIR MONITORING DATA

CLIENT Argonne Nat'l Lab. WORKER ORDER NUMBER 2104-13-02

PROJECT LOCATION Croom MD. Unit 4-D

WORK AREA ID NO. _____ SAMPLE NO. CR-04D-LR

SAMPLE TYPE

☐ PERSONNEL
NAME _____
TASK _____

☒ AMBIENT
☐ WORK AREA ☐ CLEAN ROOM
☐ ADJACENT ROOM ☐ AFD EXHAUST
☐ BACKGROUND
☒ OTHER Living Room Vent

☐ CLEARANCE
☐ INITIAL
☐ FINAL, REOCCUPANCY
☐ OTHER _____
☐ TWA SAMPLE (SEE ADDITIONAL SHEETS)

SAMPLE DATA

Filter area (FA), mm² ☐ 855 ☒ 385

PUMP ID. 99

PUMP Cal Initial 21 (no) 11.4 (rate) 11.4 (Mean Flow) L/min

PUMP Cal Final 22 (no) 11.4 (rate) 1640 (Sample Vol (VA)) L

1416 Time Began | 1640 Time End | 144 min Sample Time

L. Nelms Technician | 26 Apr. '90 Date

ANALYTICAL DATA

ANALYST _____

Scope ID _____ | Microscopic Field Area (MFA) _____ mm²

Date Time Mounted _____ | Date Time Counted _____

Total Fibers Counted _____ | Total Fields Counted _____

Average Count _____ f/fld | Blank Count _____ f/fld

Blank Corrected Count (BCC) _____ | Fiber Density _____ f/mm²

Detection Limit (DL) _____ f/cc | Concentration (C) _____ f/cc

$C = \frac{(BCC)(FA)}{(VA)(MFA)(1000)}$ DL = 10 fibers/100 fields

The above-reported results were obtained when the sample was counted in accordance with NIOSH 7400.

Signature _____ Date _____

	1	2	3	4	5	6	7	8	9	10
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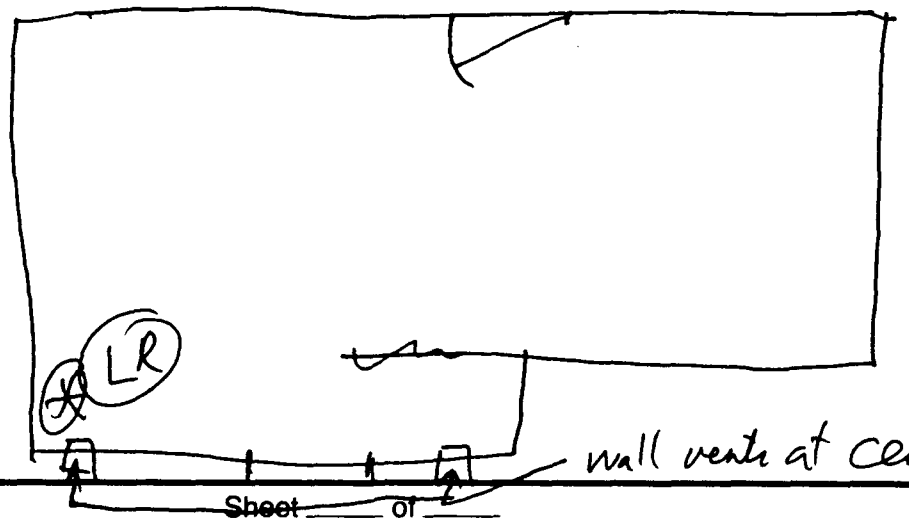
NOTES/SKETCHES REMARKS

TEM



AIR MONITORING DATA

CLIENT Argonne Nat'l Lab WORKER ORDER NUMBER 2104-13-02

PROJECT LOCATION Croom MD. Unit 4-D

WORK AREA ID NO. _____ SAMPLE NO. CR-04D-HA

SAMPLE TYPE

☐ PERSONNEL
NAME _____
TASK _____

☒ AMBIENT
☐ WORK AREA ☐ CLEAN ROOM
☐ ADJACENT ROOM ☐ AFD EXHAUST
☐ BACKGROUND
☐ OTHER Hall Vent (ceiling)

☐ CLEARANCE
☐ INITIAL
☐ FINAL, REOCCUPANCY
☐ OTHER _____
☐ TWA SAMPLE (SEE ADDITIONAL SHEETS)

SAMPLE DATA

Filter area (FA), mm²: ☐ 855 ☒ 385

PUMP ID. 97

PUMP Cal Initial: 21 (no) 9.3 (rate) 10.4 (Mean Flow) L/min

PUMP Cal Final: 22 (no) 11.4 (rate) 1720 (Sample Vol (VA)) L

1447 (Time Began) 1703 (Time End) 166 (Sample Time) min

L. Nelms (Technician) 26 Apr 90 (Date)

ANALYTICAL DATA

ANALYST _____

Scope ID _____ Microscopic Field Area (MFA) _____ mm²

Date Time Mounted _____ Date Time Counted _____

Total Fibers Counted _____ Total Fields Counted _____

Average Count _____ f/fld Blank Count _____ f/fld

Blank Corrected Count (BCC) _____ Fiber Density _____ f/mm²

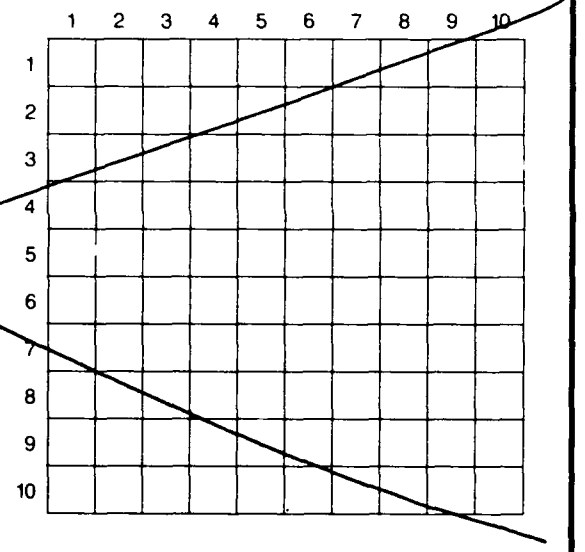
Detection Limit (DL) _____ f/cc Concentration (C) _____ f/cc

$$C = \frac{(BCC)(FA)}{(VA)(MFA)(1000)}$$

DL = 10 fibers/100 fields

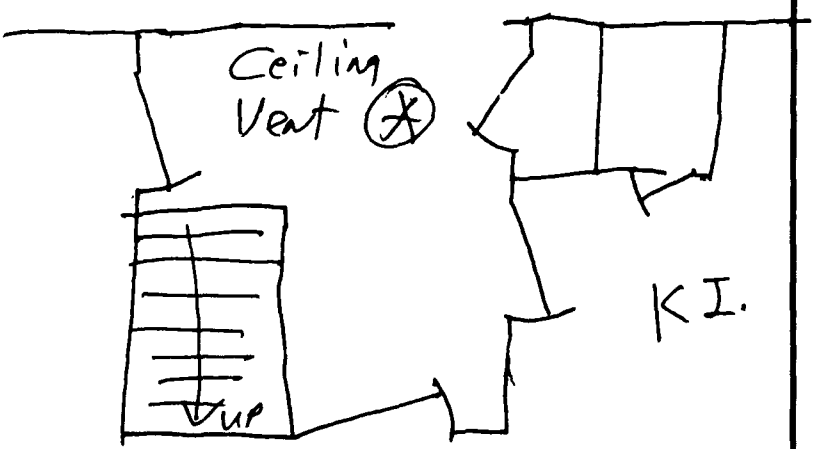
The above-reported results were obtained when the sample was counted in accordance with NIOSH 7400.

Signature _____ Date _____



NOTES/SKETCHES REMARKS

TEM.



AIR MONITORING DATA

CLIENT Argonne Nat'l Lab ATC PROJECT NUMBER 2104-13-02

PROJECT LOCATION Croom MD. Unit 4D

WORK AREA ID NO. _____ SAMPLE NO. CR-04D-BR

SAMPLE TYPE

☐ PERSONNEL
NAME _____
TASK _____

☒ AMBIENT
☐ WORK AREA ☐ CLEAN ROOM
☐ ADJACENT ROOM ☐ AFD EXHAUST
☐ BACKGROUND
☐ OTHER Bedroom Vent (wall)

☐ CLEARANCE
☐ INITIAL
☐ FINAL, REOCCUPANCY
☐ OTHER _____
☐ TWA SAMPLE
(SEE ADDITIONAL SHEETS)

SAMPLE DATA

Filter area (FA), mm²: ☐ 855 ☒ 385

PUMP ID 82

PUMP Cal Initial 15 (no) 11.3 (rate) 11.2 L/min (Mean Flow)

PUMP Cal Final 16 (no) 11.2 (rate) 1640 L (Sample Vol (VA))

1420 Time Began | 1646 Time End | 146 min Sample Time

L. Nelms Technician | 26 Apr. '90 Date

ANALYTICAL DATA

ANALYST _____

Scope ID _____ | Microscopic Field Area (MFA) _____ mm²

Date Time Mounted _____ | Date Time Counted _____

Total Fibers Counted _____ | Total Fields Counted _____

Average Count _____ f/fld | Blank Count _____ f/fld

Blank Corrected Count (BCC) _____ | Fiber Density _____ f/mm²

Detection Limit (DL) _____ f/cc | Concentration (C) _____ f/cc

$$C = \frac{(BCC)(FA)}{(VA)(MFA)(1000)}$$

DL = 10 fibers 100 fields

The above-reported results were obtained when the sample was counted in accordance with NIOSH 7400.

Signature _____ Date _____

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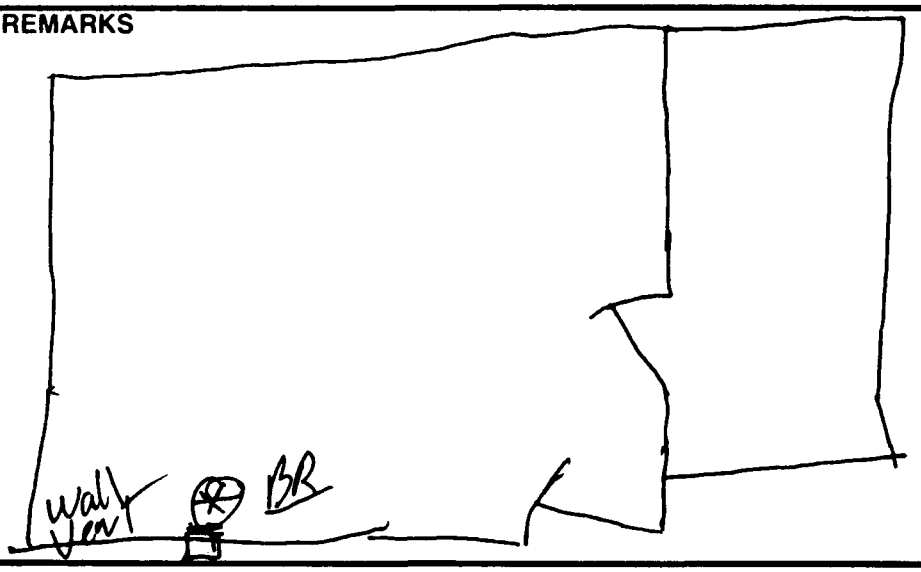
NOTES/SKETCHES REMARKS

TEM



AIR MONITORING DATA

CLIENT Argonne Nat'l Lab WORKER ORDER NUMBER 2104-13-02

PROJECT LOCATION Croom MD. Unit 4D

WORK AREA ID NO. _____ SAMPLE NO. CR-04D-BA

SAMPLE TYPE

☐ PERSONNEL
NAME _____
TASK _____

☒ AMBIENT
☐ WORK AREA ☐ CLEAN ROOM
☐ ADJACENT ROOM ☐ AFD EXHAUST
☐ BACKGROUND
☒ OTHER Bathroom Vent (wall)

☐ CLEARANCE
☐ INITIAL
☐ FINAL, REOCCUPANCY
☐ OTHER _____
☐ TWA SAMPLE
(SEE ADDITIONAL SHEETS)

SAMPLE DATA

Filter area (FA) mm: ☐ 855 ☒ 385

PUMP ID 80

PUMP Cal Initial 19 no. 11.4 rate 11.4 Mean Flow L min

PUMP Cal Final 20 no. 11.4 rate 1650 Sample Vol. (VA) L

1419 Time Begin 1644 Time End 145 Sample Time min

L. Nelms Technician _____ 26 Apr. '98 Date

ANALYTICAL DATA

ANALYST _____

Scope ID _____ Microscopic Field Area (MFA) _____ mm²

Date Time Mounted _____ Date Time Counted _____

Total Fibers Counted _____ Total Fields Counted _____

Average Count _____ f/fld Blank Count _____ f/fld

Blank Corrected Count (BCC) _____ Fiber Density _____ f/mm²

Detection Limit (DL) _____ f/cc Concentration (C) _____ f/cc

$$C = \frac{(BCC)(FA)}{(VA)(MFA)(1000)}$$

DL = 10 fibers/100 fields

The above-reported results were obtained when the sample was counted in accordance with NIOSH 7400.

Signature _____ Date _____

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NOTES/SKETCHES REMARKS

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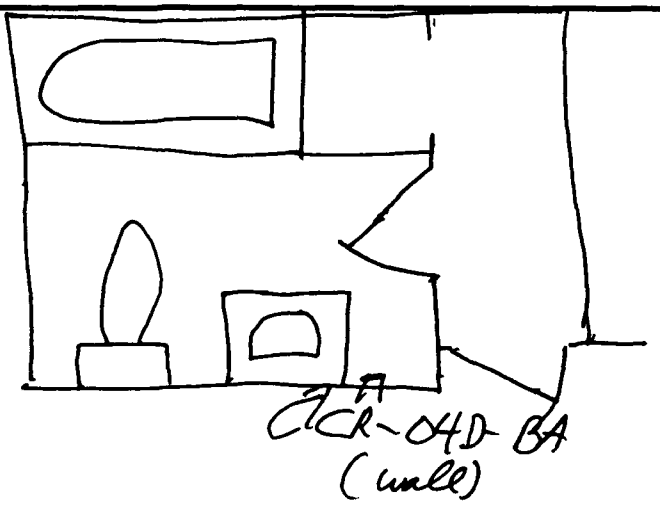

AIR MONITORING DATA

CLIENT Argonne Nat'l Lab WORKER ORDER NUMBER 2104-13-02

PROJECT LOCATION Croom MD - Unit 4D

WORK AREA ID NO. _____ SAMPLE NO. CR-04D-~~BR~~ UT

SAMPLE TYPE

☒ AMBIENT ☐ CLEARANCE

☐ PERSONNEL
NAME _____
TASK _____

☐ WORK AREA ☐ CLEAN ROOM
☐ ADJACENT ROOM ☐ AFD EXHAUST
☐ BACKGROUND
☒ OTHER Bedroom West (wall) Utility Room

☐ INITIAL
☐ FINAL, REOCCUPANCY
☐ OTHER _____
☐ TWA SAMPLE (SEE ADDITIONAL SHEETS)

SAMPLE DATA

Filter area (FA), mm²: ☐ 855 ☒ 385

PUMP ID. 78

PUMP Cal Initial 20 (no) 11.2 (rate) 11.1 (Mean Flow) L min

PUMP Cal Final 21 (no) 11.0 (rate) 2080 (Sample Vol (VA)) L

1434 (Time Began) 1741 (Time End) 187 (Sample Time) min

L. Nelms (Technician) 26 Apr '96 (Date)

ANALYTICAL DATA

ANALYST _____

Scope ID	Microscopic Field Area (MFA) mm²
Date Time Mounted	Date Time Counted
Total Fibers Counted	Total Fields Counted
Average Count f/fld	Blank Count f/fld
Blank Corrected Count (BCC)	Fiber Density f/mm²
Detection Limit (DL) f/cc	Concentration (C) f/cc

$$C = \frac{(BCC)(FA)}{(VA)(MFA)(1000)}$$

DL = 10 fibers/100 fields

The above-reported results were obtained when the sample was counted in accordance with NIOSH 7400.

Signature _____ Date _____

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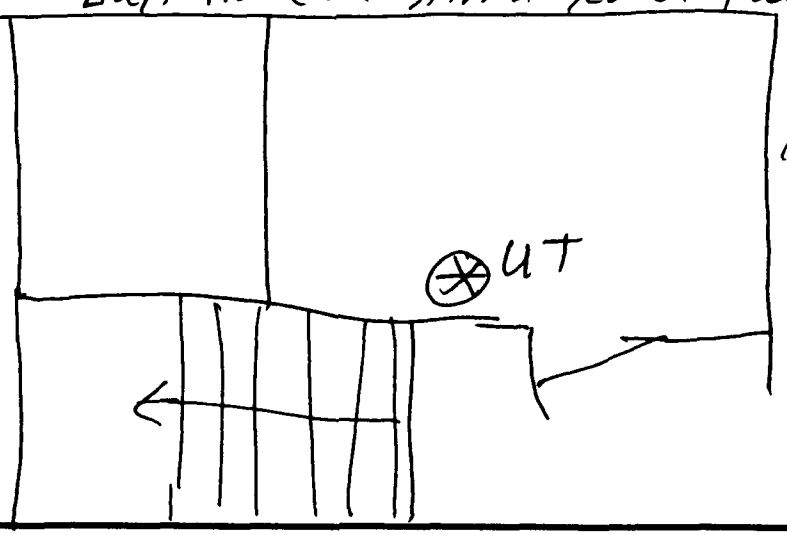
NOTES/SKETCHES REMARKS

Dust in Room Stirred Several Times During Last 40 Minutes (after other Samples Complete)

TEM



AIR MONITORING DATA

CLIENT Argonne Nat'l Lab WORKER ORDER NUMBER 2104-13-02

PROJECT LOCATION Croom MD. Unit 4D

WORK AREA ID NO. _____ SAMPLE NO. CR-04D-OUT

SAMPLE TYPE

- ☐ PERSONNEL
  - NAME _____
  - TASK _____
- ☒ AMBIENT
  - ☐ WORK AREA
  - ☐ ADJACENT ROOM
  - ☒ BACKGROUND
  - ☐ OTHER _____
- ☐ CLEAN ROOM
- ☐ AFD EXHAUST
- ☐ CLEARANCE
  - ☐ INITIAL
  - ☐ FINAL, REOCCUPANCY
  - ☐ OTHER _____
- ☐ TWA SAMPLE (SEE ADDITIONAL SHEETS)

SAMPLE DATA

Filter area (FA), mm ☐ 855 ☒ 385

PUMP ID 70

PUMP Cal Initial 23 (no) 11.2 (rate) 11.2 L/min (Mean Flow)

PUMP Cal Final 23 (no) 11.3 (rate) 1690 L (Sample Vol (VA))

1426 (Time Began) 1656 (Time End) 150 min (Sample Time)

L. Nelms (Technician) 26 Apr '90 (Date)

ANALYTICAL DATA

ANALYST _____

Scope ID _____ Microscopic Field Area (MFA) _____ mm²

Date Time Mounted _____ Date Time Counted _____

Total Fibers Counted _____ Total Fields Counted _____

Average Count _____ f/fld Blank Count _____ f/fld

Blank Corrected Count (BCC) _____ Fiber Density _____ f/mm²

Detection Limit (DL) _____ f/cc Concentration (C) _____ f/cc

$$C = \frac{(BCC)(FA)}{(VA)(MFA)(1000)}$$

DL = 10 fibers/100 fields

The above-reported results were obtained when the sample was counted in accordance with NIOSH 7400.

Signature _____ Date _____

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NOTES/SKETCHES REMARKS

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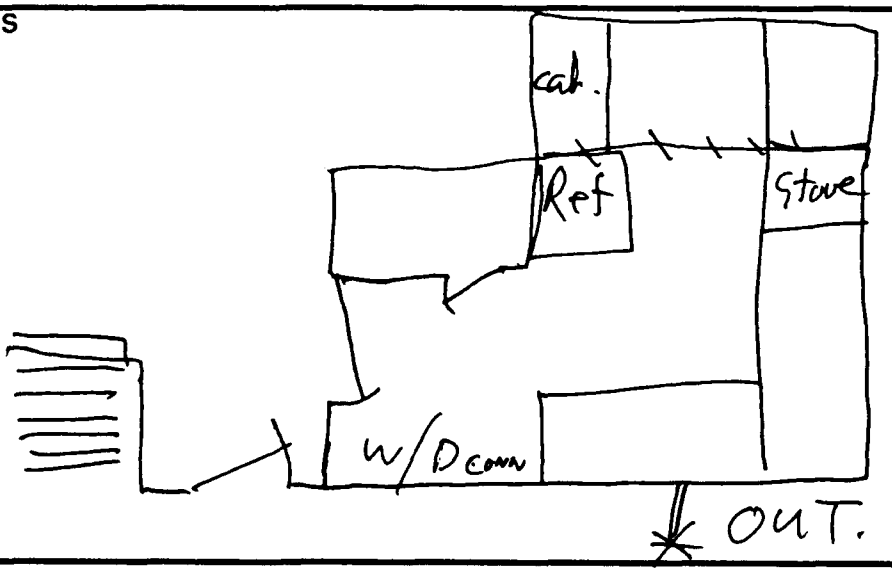

AIR MONITORING DATA

CLIENT Argonne Nat'l Lab. WORKER ORDER NUMBER 2104-13-02

PROJECT LOCATION Croom MD - Unit 4D

WORK AREA ID NO. _____ SAMPLE NO. CR-04D-FB

SAMPLE TYPE

☐ PERSONNEL
NAME _____
TASK _____

☒ AMBIENT
☐ WORK AREA ☐ CLEAN ROOM
☐ ADJACENT ROOM ☐ AFD EXHAUST
☐ BACKGROUND
☒ OTHER Field Blank

☐ CLEARANCE
☐ INITIAL
☐ FINAL, REOCCUPANCY
☐ OTHER _____
☐ TWA SAMPLE
(SEE ADDITIONAL SHEETS)

SAMPLE DATA

Filter area (FA), mm: ☐ 855 ☒ 385

PUMP ID. None

PUMP Cal Initial N/A no _____ rate 0 L/min Mean Flow

PUMP Cal Final N/A no _____ rate 0 L Sample Vol (VA)

1415 Time Began 1704 Time End 169 min Sample Time

L. Nelms Technician 26 Apr 90 Date

ANALYTICAL DATA

ANALYST _____

Scope ID _____ Microscopic Field Area (MFA) _____ mm²

Date Time Mounted _____ Date Time Counted _____

Total Fibers Counted _____ Total Fields Counted _____

Average Count _____ f/fld Blank Count _____ f/fld

Blank Corrected Count (BCC) _____ Fiber Density _____ f/mm²

Detection Limit (DL) _____ f/cc Concentration _____ f/cc

$C = \frac{(BCC)(FA)}{(VA)(MFA)(1000)}$

DL = 10 fibers/100 fields

The above-reported results were obtained when the sample was counted in accordance with NIOSH 7400.

Signature _____ Date _____

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NOTES/SKETCHES REMARKS

TEM

APPENDIX B.2. LABORATORY DATA
AIRBORNE ASBESTOS SAMPLING

ROY F. WESTON, INC.
1635 PUMPHREY AVE.
AUBURN, AL 36830
PHONE: (205) 826-6100
FAX: (205) 826-8232

TRANSMISSION ELECTRON MICROSCOPY ASBESTOS ANALYSIS REPORT

Client: ARGONNE
Client Sample ID: CR-04D-LR

Weston W.O. No.: 2104-13-02-0000
Weston Sample ID No.: EE997

Received by: Beth Hiltbold
Analyzed by: Greg Hall

Date Received: 04/30/90
Date Analyzed: 05/01/90

Filter Type: 0.45 μm, 25 mm, MEC
Number of Grids Examined: 2
Average Grid Square Area: 0.0088 mm²
Sample Volume: 1640.0 liters
EPA Analysis: AHERA

Filter Area: 385 mm²
Number of Grid Squares Examined: 6
Total Area Examined: 0.0528 mm²
Detection Limit: 0.00445 fibers/cc
Grid Archive No.: 0228-A-8,9

ANALYTICAL RESULTS

	Chrysotile		Amphiboles			
	<5μm	≥5μm	<5μm	≥5μm	Ambiguous	Non-Asbestos
Number of Fibers Analyzed:	0	0	0	0	0	0
Number of Bundles Analyzed:	0	0	0	0	0	0
Number of Clusters Analyzed:	0	0	0	0	0	0
Number of Matrices Analyzed:	0	0	0	0	0	0

SUMMARY

Concentration of Asbestos Structures < 5μm in length: ND (structures/cc)

Concentration of Asbestos Structures ≥ 5μm in length: ND (structures/cc)

Concentration of Asbestos Structures < 5μm in length: ND (structures/mm²)

Concentration of Asbestos Structures ≥ 5μm in length: ND (structures/mm²)

Total Concentration of Asbestos Structures ND (structures/cc)

Total Concentration of Asbestos Structures ND (structures/mm²)

Comments:

Barry Rayfield
(Approved for Transmittal)

May 2, 1990
(Date)

This test report relates only to the specific items tested.

ROY F. WESTON, INC.
1635 PUMPHREY AVE.
AUBURN, AL 36830
PHONE: (205) 826-6100
FAX: (205) 826-8232

TRANSMISSION ELECTRON MICROSCOPY ASBESTOS ANALYSIS REPORT

Client: ARGONNE
Client Sample ID: CR-04D-HA

Weston W.O. No.: 2104-13-02-0000
Weston Sample ID No.: EE998

Received by: Beth Hiltbold
Analyzed by: Greg Hall

Date Received: 04/30/90
Date Analyzed: 05/02/90

Filter Type: 0.45 μm, 25 mm, MEC
Number of Grids Examined: 2
Average Grid Square Area: 0.0088 mm²
Sample Volume: 1720.0 liters
EPA Analysis: AHERA

Filter Area: 385 mm²
Number of Grid Squares Examined: 6
Total Area Examined: 0.0528 mm²
Detection Limit: 0.00424 fibers/cc
Grid Archive No.: 0228-B-6,7

ANALYTICAL RESULTS

	Chrysotile		Amphiboles			
	<5μm	≥5μm	<5μm	≥5μm	Ambiguous	Non-Asbestos
Number of Fibers Analyzed:	0	0	0	0	0	1
Number of Bundles Analyzed:	0	0	0	0	0	0
Number of Clusters Analyzed:	0	0	0	0	0	0
Number of Matrices Analyzed:	0	0	0	0	0	0

SUMMARY

Concentration of Asbestos Structures < 5μm in length: ND (structures/cc)

Concentration of Asbestos Structures ≥ 5μm in length: ND (structures/cc)

Concentration of Asbestos Structures < 5μm in length: ND (structures/mm²)

Concentration of Asbestos Structures ≥ 5μm in length: ND (structures/mm²)

Total Concentration of Asbestos Structures ND (structures/cc)

Total Concentration of Asbestos Structures ND (structures/mm²)

Comments:

Barry Rayfield
(Approved for Transmittal)

May 2, 1990
(Date)

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AUBURN, AL 36830
PHONE: (205) 826-6100
FAX: (205) 826-8232

TRANSMISSION ELECTRON MICROSCOPY ASBESTOS ANALYSIS REPORT

Client: ARGONNE
Client Sample ID: CR-04D-BR

Weston W.O. No.: 2104-13-02-0000
Weston Sample ID No.: EE999

Received by: Beth Hiltbold
Analyzed by: Greg Hall

Date Received: 04/30/90
Date Analyzed: 05/02/90

Filter Type: 0.45 μm, 25 mm, MEC
Number of Grids Examined: 2
Average Grid Square Area: 0.0088 mm²
Sample Volume: 1640.0 liters
EPA Analysis: AHERA

Filter Area: 385 mm²
Number of Grid Squares Examined: 6
Total Area Examined: 0.0528 mm²
Detection Limit: 0.00445 fibers/cc
Grid Archive No.: 0228-B-9,10

ANALYTICAL RESULTS

	Chrysotile		Amphiboles			
	<5μm	≥5μm	<5μm	≥5μm	Ambiguous	Non-Asbestos
Number of Fibers Analyzed:	0	0	0	0	0	0
Number of Bundles Analyzed:	0	0	0	0	0	0
Number of Clusters Analyzed:	0	0	0	0	0	0
Number of Matrices Analyzed:	0	0	0	0	0	0

SUMMARY

Concentration of Asbestos Structures < 5μm in length: ND (structures/cc)

Concentration of Asbestos Structures ≥ 5μm in length: ND (structures/cc)

Concentration of Asbestos Structures < 5μm in length: ND (structures/mm²)

Concentration of Asbestos Structures ≥ 5μm in length: ND (structures/mm²)

Total Concentration of Asbestos Structures ND (structures/cc)

Total Concentration of Asbestos Structures ND (structures/mm²)

Comments:

Barry Rayfield
(Approved for transmittal)

May 2, 1990
(Date)

This test report relates only to the specific items tested.

ROY F. WESTON, INC.
1635 PUMPHREY AVE.
AUBURN, AL 36830
PHONE: (205) 826-6100
FAX: (205) 826-8232

TRANSMISSION ELECTRON MICROSCOPY ASBESTOS ANALYSIS REPORT

Client: ARGONNE
Client Sample ID: CR-04D-BA

Weston W.O. No.: 2104-13-02-0000
Weston Sample ID No.: EF000

Received by: Beth Hiltbold
Analyzed by: Greg Hall

Date Received: 04/30/90
Date Analyzed: 05/02/90

Filter Type: 0.45 μm, 25 mm, MEC
Number of Grids Examined: 2
Average Grid Square Area: 0.0088 mm²
Sample Volume: 1650.0 liters
EPA Analysis: AHERA

Filter Area: 385 mm²
Number of Grid Squares Examined: 6
Total Area Examined: 0.0528 mm²
Detection Limit: 0.00442 fibers/cc
Grid Archive No.: 0228-C-7,8

ANALYTICAL RESULTS

	Chrysotile		Amphiboles			
	<5μm	≥5μm	<5μm	≥5μm	Ambiguous	Non-Asbestos
Number of Fibers Analyzed:	0	0	0	0	0	1
Number of Bundles Analyzed:	0	0	0	0	0	0
Number of Clusters Analyzed:	0	0	0	0	0	0
Number of Matrices Analyzed:	0	0	0	0	0	0

SUMMARY

Concentration of Asbestos Structures < 5μm in length: ND (structures/cc)

Concentration of Asbestos Structures ≥ 5μm in length: ND (structures/cc)

Concentration of Asbestos Structures < 5μm in length: ND (structures/mm²)

Concentration of Asbestos Structures ≥ 5μm in length: ND (structures/mm²)

Total Concentration of Asbestos Structures ND (structures/cc)

Total Concentration of Asbestos Structures ND (structures/mm²)

Comments:

Barry Ranfield
(Approved for Transmittal)

May 2, 1990
(Date)

This test report relates only to the specific items tested.

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AUBURN, AL 36830
PHONE: (205) 826-6100
FAX: (205) 826-8232

TRANSMISSION ELECTRON MICROSCOPY ASBESTOS ANALYSIS REPORT

Client: ARGONNE
Client Sample ID: CR-04D-UT

Weston W.O. No.: 2104-13-02-0000
Weston Sample ID No.: EF001

Received by: Beth Hiltbold
Analyzed by: Greg Hall

Date Received: 04/30/90
Date Analyzed: 05/02/90

Filter Type: 0.45 µm, 25 mm, MEC
Number of Grids Examined: 1
Average Grid Square Area: 0.0088 mm²
Sample Volume: 2080.1 liters
EPA Analysis: AHERA

Filter Area: 385 mm²
Number of Grid Squares Examined: 5
Total Area Examined: 0.0440 mm²
Detection Limit: 0.00421 fibers/cc
Grid Archive No.: 0228-C-10

ANALYTICAL RESULTS

	Chrysotile		Amphiboles			
	<5µm	≥5µm	<5µm	≥5µm	Ambiguous	Non-Asbestos
Number of Fibers Analyzed:	0	0	0	0	0	0
Number of Bundles Analyzed:	0	0	0	0	0	0
Number of Clusters Analyzed:	0	0	0	0	0	1
Number of Matrices Analyzed:	3	1	0	0	0	2

SUMMARY

Concentration of Asbestos Structures < 5µm in length: 0.013 (structures/cc)

Concentration of Asbestos Structures ≥ 5µm in length: 0.004 (structures/cc)

Concentration of Asbestos Structures < 5µm in length: 68.18 (structures/mm²)

Concentration of Asbestos Structures ≥ 5µm in length: 22.73 (structures/mm²)

Total Concentration of Asbestos Structures 0.017 (structures/cc)

Total Concentration of Asbestos Structures 90.91 (structures/mm²)

Comments: An energy dispersive spectrum (EF001.eds), a diffraction pattern (B805), and a micrograph (B806) were recorded.

Barry Rayfield
(Approved for Transmittal)

May 2, 1990
(Date)

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AUBURN, AL 36830
PHONE: (205) 826-6100
FAX: (205) 826-8232

TRANSMISSION ELECTRON MICROSCOPY ASBESTOS ANALYSIS REPORT

Client: ARGONNE
Client Sample ID: CR-04D-OUT

Weston W.O. No.: 2104-13-02-0000
Weston Sample ID No.: EF002

Received by: Beth Hiltbold
Analyzed by: Beth Hiltbold

Date Received: 04/30/90
Date Analyzed: 05/03/90

Filter Type: 0.45 μm, 25 mm, MEC
Number of Grids Examined: 2
Average Grid Square Area: 0.0088 mm²
Sample Volume: 1690.0 liters
EPA Analysis: AHERA

Filter Area: 385 mm²
Number of Grid Squares Examined: 6
Total Area Examined: 0.0528 mm²
Detection Limit: 0.00431 fibers/cc
Grid Archive No.: 0229-C-7,8

ANALYTICAL RESULTS

	Chrysotile		Amphiboles			
	<5μm	≥5μm	<5μm	≥5μm	Ambiguous	Non-Asbestos
Number of Fibers Analyzed:	0	0	0	0	0	0
Number of Bundles Analyzed:	0	0	0	0	0	1
Number of Clusters Analyzed:	0	0	0	0	0	0
Number of Matrices Analyzed:	0	0	0	0	0	0

SUMMARY

Concentration of Asbestos Structures < 5μm in length: ND (structures/cc)

Concentration of Asbestos Structures ≥ 5μm in length: ND (structures/cc)

Concentration of Asbestos Structures < 5μm in length: ND (structures/mm²)

Concentration of Asbestos Structures ≥ 5μm in length: ND (structures/mm²)

Total Concentration of Asbestos Structures ND (structures/cc)

Total Concentration of Asbestos Structures ND (structures/mm²)

Comments:

Barry Rayfield
(Approved for Transmittal)

May 3, 1990
(Date)

This test report relates only to the specific items tested.

ROY F. WESTON, INC.
1635 PUMPHREY AVE.
AUBURN, AL 36830
PHONE: (205) 826-6100
FAX: (205) 826-8232

TRANSMISSION ELECTRON MICROSCOPY ASBESTOS ANALYSIS REPORT

Client: ARGONNE
Client Sample ID: CR-04D-FB

Weston W.O. No.: 2104-13-02-0000
Weston Sample ID No.: EF003

Received by: Beth Hiltbold
Analyzed by: Beth Hiltbold

Date Received: 04/30/90
Date Analyzed: 05/03/90

Filter Type: 0.45 μm, 25 mm, MEC
Number of Grids Examined: 2
Average Grid Square Area: 0.0088 mm²
Sample Volume: 0.0 liters
EPA Analysis: AHERA

Filter Area: 385 mm²
Number of Grid Squares Examined: 10
Total Area Examined: 0.0880 mm²
Detection Limit: BLANK SAMPLE
Grid Archive No.: 0229-C-10, D-6

ANALYTICAL RESULTS

	Chrysotile		Amphiboles			
	<5μm	≥5μm	<5μm	≥5μm	Ambiguous	Non-Asbestos
Number of Fibers Analyzed:	0	0	0	0	0	0
Number of Bundles Analyzed:	0	0	0	0	0	0
Number of Clusters Analyzed:	0	0	0	0	0	0
Number of Matrices Analyzed:	0	0	0	0	0	0

SUMMARY

Concentration of Asbestos Structures < 5μm in length: BLANK (structures/cc)

Concentration of Asbestos Structures ≥ 5μm in length: BLANK (structures/cc)

Concentration of Asbestos Structures < 5μm in length: BLANK (structures/mm²)

Concentration of Asbestos Structures ≥ 5μm in length: BLANK (structures/mm²)

Total Concentration of Asbestos Structures BLANK (structures/cc)

Total Concentration of Asbestos Structures BLANK (structures/mm²)

Comments:

Barry Rayfield
(Approved for Transmittal)

May 3, 1990
(Date)

This test report relates only to the specific items tested.